

MSSMCT (1-loop counter terms)

[FF] 2 Charginos	2	[SSS] Higgs – 2 Squarks	49
[FF] 2 Gluinos	2	[SSSS] 2 Higgs – 2 Sleptons	59
[FF] 2 Leptons	2	[SSSS] 2 Higgs – 2 Squarks	74
[FF] 2 Neutralinos	3	[SSSS] 2 Sleptons – 2 Squarks	109
[FF] 2 Quarks	3	[SSSS] 4 Higgs	113
[FFS] 2 Charginos – Higgs	4	[SSSS] 4 Sleptons	125
[FFS] 2 Leptons – Higgs	5	[SSSS] 4 Squarks	127
[FFS] 2 Neutralinos – Higgs	8	[SSV] 2 Higgs – Gauge Boson	130
[FFS] 2 Quarks – Higgs	12	[SSV] 2 Sleptons – Gauge Boson	132
[FFS] Chargino – Lepton – Slepton	15	[SSV] 2 Squarks – Gauge Boson	133
[FFS] Chargino – Neutralino – Higgs	16	[SSV] 2 Squarks – Gluon	134
[FFS] Chargino – Quark – Squark	20	[SSVV] 2 Higgs – 2 Gauge Bosons	134
[FFS] Gluino – Quark – Squark	22	[SSVV] 2 Sleptons – 2 Gauge Bosons	138
[FFS] Lepton – Neutralino – Slepton	22	[SSVV] 2 Squarks – 2 Gauge Bosons	139
[FFS] Neutralino – Quark – Squark	25	[SSVV] 2 Squarks – 2 Gluons	142
[FFV] 2 Charginos – Gauge Boson	28	[SSVV] 2 Squarks – Gauge Boson – Gluon	142
[FFV] 2 Gluinos – Gluon	29	[SV] Higgs – Gauge Boson	143
[FFV] 2 Leptons – Gauge Boson	29	[SVV] Higgs – 2 Gauge Bosons	144
[FFV] 2 Neutralinos – Gauge Boson	31	[UU] 2 Ghosts	145
[FFV] 2 Quarks – Gauge Boson	31	[UUV] 2 Ghosts – Gauge Boson	146
[FFV] 2 Quarks – Gluon	32	[VV] 2 Gauge Bosons	148
[FFV] Chargino – Neutralino – Gauge Boson	33	[VV] 2 Gluons	148
[SS] 2 Higgs	34	[VVV] 3 Gauge Bosons	149
[SS] 2 Sleptons	36	[VVV] 3 Gluons	149
[SS] 2 Squarks	36	[VVVV] 4 Gauge Bosons	149
[SSS] 3 Higgs	37	[VVVV] 4 Gluons	150
[SSS] Higgs – 2 Sleptons	42		

[FF] 2 Charginos

$$C_{443}(\tilde{\chi}_{c1}^+, \tilde{\chi}_{c2}^-) = \begin{bmatrix} -\frac{i}{2} \left(\delta \bar{Z}_{c1,c2}^{\chi,L} + \delta Z_{c1,c2}^{\chi,L} \right) \\ \frac{i}{2} \left(\delta \bar{Z}_{c1,c2}^{\chi,R} + \delta Z_{c1,c2}^{\chi,R} \right) \\ -\frac{i}{2} \left(2 \delta M_{c1,c2}^{\chi} + \delta Z_{c1,c2}^{\chi,L} m_{\tilde{\chi}_{c1}^-} + \delta \bar{Z}_{c1,c2}^{\chi,R} m_{\tilde{\chi}_{c2}^-} \right) \\ -\frac{i}{2} \left(2 \delta M_{c2,c1}^{\chi*} + \delta Z_{c1,c2}^{\chi,R} m_{\tilde{\chi}_{c1}^-} + \delta \bar{Z}_{c1,c2}^{\chi,L} m_{\tilde{\chi}_{c2}^-} \right) \end{bmatrix}$$

[FF] 2 Gluinos

$$C_{475}(\tilde{g}, \tilde{g}) = \begin{bmatrix} -\frac{i \delta_{g1,g2}}{2} (\delta \bar{Z}_{\tilde{g}}^L + \delta Z_{\tilde{g}}^L) \\ \frac{i \delta_{g1,g2}}{2} (\delta \bar{Z}_{\tilde{g}}^R + \delta Z_{\tilde{g}}^R) \\ -\frac{i \delta_{g1,g2}}{2} (2 \delta m_{\tilde{g}} + m_{\tilde{g}} (\delta \bar{Z}_{\tilde{g}}^R + \delta Z_{\tilde{g}}^L)) \\ -\frac{i \delta_{g1,g2}}{2} (2 \delta m_{\tilde{g}}^* + m_{\tilde{g}} (\delta \bar{Z}_{\tilde{g}}^L + \delta Z_{\tilde{g}}^R)) \end{bmatrix}$$

[FF] 2 Leptons

$$C_{418}(\bar{\nu}_{j1}, \nu_{j2}) = \begin{bmatrix} -\frac{i \delta_{j1,j2}}{2} (\delta \bar{Z}_{j1,j1}^{\nu,L} + \delta Z_{j1,j1}^{\nu,L}) \\ \frac{i \delta_{j1,j2}}{2} (\delta \bar{Z}_{j1,j1}^{\nu,R} + \delta Z_{j1,j1}^{\nu,R}) \\ 0 \\ 0 \end{bmatrix}$$

$$C_{419}(\bar{e}_{j1}, e_{j2}) = \begin{bmatrix} -\frac{i\delta_{j1,j2}}{2} \left(\delta\bar{Z}_{j1,j1}^{e,L} + \delta Z_{j1,j1}^{e,L} \right) \\ \frac{i\delta_{j1,j2}}{2} \left(\delta\bar{Z}_{j1,j1}^{e,R} + \delta Z_{j1,j1}^{e,R} \right) \\ -\frac{i\delta_{j1,j2}}{2} \left(2\delta m_{j1}^e + m_{e_{j1}} \left(\delta\bar{Z}_{j1,j1}^{e,R} + \delta Z_{j1,j1}^{e,L} \right) \right) \\ -\frac{i\delta_{j1,j2}}{2} \left(2\delta m_{j1}^e + m_{e_{j1}} \left(\delta\bar{Z}_{j1,j1}^{e,L} + \delta Z_{j1,j1}^{e,R} \right) \right) \end{bmatrix}$$

[FF] 2 Neutralinos

$$C_{444}(\tilde{\chi}_{n1}^0, \tilde{\chi}_{n2}^0) = \begin{bmatrix} -\frac{i}{2} \left(\delta\bar{Z}_{n1,n2}^{\chi^0,L} + \delta Z_{n1,n2}^{\chi^0,L} \right) \\ \frac{i}{2} \left(\delta\bar{Z}_{n1,n2}^{\chi^0,R} + \delta Z_{n1,n2}^{\chi^0,R} \right) \\ -\frac{i}{2} \left(2\delta M_{n1,n2}^{\chi^0} + \delta Z_{n1,n2}^{\chi^0,L} m_{\tilde{\chi}_{n1}^0} + \delta\bar{Z}_{n1,n2}^{\chi^0,R} m_{\tilde{\chi}_{n2}^0} \right) \\ -\frac{i}{2} \left(2\delta M_{n2,n1}^{\chi^{0*}} + \delta Z_{n1,n2}^{\chi^0,R} m_{\tilde{\chi}_{n1}^0} + \delta\bar{Z}_{n1,n2}^{\chi^0,L} m_{\tilde{\chi}_{n2}^0} \right) \end{bmatrix}$$

[FF] 2 Quarks

$$C_{420}(\bar{u}_{j1}, u_{j2}) = \begin{bmatrix} -\frac{i}{2} \left(\delta\bar{Z}_{j2,j1}^{u,L} + \delta Z_{j1,j2}^{u,L} \right) \\ \frac{i}{2} \left(\delta\bar{Z}_{j2,j1}^{u,R} + \delta Z_{j1,j2}^{u,R} \right) \\ -\frac{i}{2} \left(2\delta_{j1,j2} \delta m_{j1}^u + \delta Z_{j1,j2}^{u,L} m_{u_{j1}} + \delta\bar{Z}_{j1,j2}^{u,R} m_{u_{j2}} \right) \\ -\frac{i}{2} \left(2\delta_{j1,j2} \delta m_{j1}^u + \delta Z_{j1,j2}^{u,R} m_{u_{j1}} + \delta\bar{Z}_{j1,j2}^{u,L} m_{u_{j2}} \right) \end{bmatrix}$$

$$C_{421}(\bar{d}_{j1}, d_{j2}) = \begin{bmatrix} -\frac{i}{2} \left(\delta \bar{Z}_{j2,j1}^{d,L} + \delta Z_{j1,j2}^{d,L} \right) \\ \frac{i}{2} \left(\delta \bar{Z}_{j2,j1}^{d,R} + \delta Z_{j1,j2}^{d,R} \right) \\ -\frac{i}{2} \left(2 \delta_{j1,j2} \delta m_{j1}^d + \delta Z_{j1,j2}^{d,L} m_{d_{j1}} + \delta \bar{Z}_{j1,j2}^{d,R} m_{d_{j2}} \right) \\ -\frac{i}{2} \left(2 \delta_{j1,j2} \delta m_{j1}^d + \delta Z_{j1,j2}^{d,R} m_{d_{j1}} + \delta \bar{Z}_{j1,j2}^{d,L} m_{d_{j2}} \right) \end{bmatrix}$$

[FFS] 2 Charginos – Higgs

$$C_{251}(\tilde{\chi}_{c1}^-, \tilde{\chi}_{c2}^+, h^0) = \begin{bmatrix} \frac{ie}{2\sqrt{2}s_W^2} \left\{ s_W \left(\delta Z_{1,c1}^{\chi,L} (s_\alpha U_{1,2}^* V_{c2,1}^* - c_\alpha U_{1,1}^* V_{c2,2}^*) + \delta Z_{2,c1}^{\chi,L} (s_\alpha U_{2,2}^* V_{c2,1}^* - c_\alpha U_{2,1}^* V_{c2,2}^*) \right) - \right. \\ U_{c1,2}^* \left(V_{c2,1}^* (c_\alpha \delta Z_{hH} s_W + s_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{hh}))) - s_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,1}^* \right) \right) - \\ \left. U_{c1,1}^* \left(V_{c2,2}^* (\delta Z_{hH} s_\alpha s_W - c_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{hh}))) + c_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,2}^* \right) \right) \right\} \\ \frac{ie}{2\sqrt{2}s_W^2} \left\{ s_W \left(\delta Z_{1,c1}^{\chi,R} (s_\alpha U_{c2,2} V_{1,1} - c_\alpha U_{c2,1} V_{1,2}) + \delta Z_{2,c1}^{\chi,R} (s_\alpha U_{c2,2} V_{2,1} - c_\alpha U_{c2,1} V_{2,2}) \right) - \right. \\ V_{c1,1} \left(U_{c2,2} (c_\alpha \delta Z_{hH} s_W + s_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{hh}))) - s_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,2} \right) \right) - \\ \left. V_{c1,2} \left(U_{c2,1} (\delta Z_{hH} s_\alpha s_W - c_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{hh}))) + c_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,1} \right) \right) \right\} \end{bmatrix}$$

$$C_{252}(\tilde{\chi}_{c1}^-, \tilde{\chi}_{c2}^+, H^0) = \begin{bmatrix} -\frac{ie}{2\sqrt{2}s_W^2} \left\{ s_W \left(\delta Z_{1,c1}^{\chi,L} (c_\alpha U_{1,2}^* V_{c2,1}^* + s_\alpha U_{1,1}^* V_{c2,2}^*) + \delta Z_{2,c1}^{\chi,L} (c_\alpha U_{2,2}^* V_{c2,1}^* + s_\alpha U_{2,1}^* V_{c2,2}^*) \right) - \right. \\ U_{c1,2}^* \left(V_{c2,1}^* (\delta Z_{hH} s_\alpha s_W + c_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{HH}))) - c_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,1}^* \right) \right) + \\ \left. U_{c1,1}^* \left(V_{c2,2}^* (c_\alpha \delta Z_{hH} s_W - s_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{HH}))) + s_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,2}^* \right) \right) \right\} \\ -\frac{ie}{2\sqrt{2}s_W^2} \left\{ s_W \left(\delta Z_{1,c1}^{\chi,R} (c_\alpha U_{c2,2} V_{1,1} + s_\alpha U_{c2,1} V_{1,2}) + \delta Z_{2,c1}^{\chi,R} (c_\alpha U_{c2,2} V_{2,1} + s_\alpha U_{c2,1} V_{2,2}) \right) - \right. \\ V_{c1,1} \left(U_{c2,2} (\delta Z_{hH} s_\alpha s_W + c_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{HH}))) - c_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,2} \right) \right) + \\ \left. V_{c1,2} \left(U_{c2,1} (c_\alpha \delta Z_{hH} s_W - s_\alpha (2\delta s_W - s_W (2\delta Z_e + \delta Z_{HH}))) + s_\alpha s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,1} \right) \right) \right\} \end{bmatrix}$$

$$\begin{aligned}
C_{253}(\tilde{\chi}_{c1}^-, \tilde{\chi}_{c2}^+, A^0) &= \left[\begin{aligned} & -\frac{e}{2\sqrt{2}s_W^2} \left\{ \begin{aligned} & s_W \left(\delta Z_{1,c1}^{\chi,L} (s_\beta U_{1,2}^* V_{c2,1}^* + c_\beta U_{1,1}^* V_{c2,2}^*) + \delta Z_{2,c1}^{\chi,L} (s_\beta U_{2,2}^* V_{c2,1}^* + c_\beta U_{2,1}^* V_{c2,2}^*) \right) - \\ & U_{c1,2}^* \left(V_{c2,1}^* (c_\beta \delta Z_{AG} s_W + s_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{AA}))) - s_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,1}^* \right) \right) + \\ & U_{c1,1}^* \left(V_{c2,2}^* (\delta Z_{AG} s_\beta s_W - c_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{AA}))) + c_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,2}^* \right) \right) \end{aligned} \right\} \\ & \frac{e}{2\sqrt{2}s_W^2} \left\{ \begin{aligned} & s_W \left(\delta Z_{1,c1}^{\chi,R} (s_\beta U_{c2,2} V_{1,1} + c_\beta U_{c2,1} V_{1,2}) + \delta Z_{2,c1}^{\chi,R} (s_\beta U_{c2,2} V_{2,1} + c_\beta U_{c2,1} V_{2,2}) \right) - \\ & V_{c1,1} \left(U_{c2,2} (c_\beta \delta Z_{AG} s_W + s_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{AA}))) - s_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,2} \right) \right) + \\ & V_{c1,2} \left(U_{c2,1} (\delta Z_{AG} s_\beta s_W - c_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{AA}))) + c_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,1} \right) \right) \end{aligned} \right\} \end{aligned} \right] \\
C_{254}(\tilde{\chi}_{c1}^-, \tilde{\chi}_{c2}^+, G^0) &= \left[\begin{aligned} & \frac{e}{2\sqrt{2}s_W^2} \left\{ \begin{aligned} & s_W \left(\delta Z_{1,c1}^{\chi,L} (c_\beta U_{1,2}^* V_{c2,1}^* - s_\beta U_{1,1}^* V_{c2,2}^*) + \delta Z_{2,c1}^{\chi,L} (c_\beta U_{2,2}^* V_{c2,1}^* - s_\beta U_{2,1}^* V_{c2,2}^*) \right) + \\ & U_{c1,1}^* \left(V_{c2,2}^* (2\delta s_W s_\beta - s_W (c_\beta \delta Z_{AG} + s_\beta (2\delta Z_e + \delta Z_{GG}))) - s_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,2}^* \right) \right) - \\ & U_{c1,2}^* \left(V_{c2,1}^* (\delta Z_{AG} s_\beta s_W + c_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{GG}))) - c_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,1}^* \right) \right) \end{aligned} \right\} \\ & -\frac{e}{2\sqrt{2}s_W^2} \left\{ \begin{aligned} & s_W \left(\delta Z_{1,c1}^{\chi,R} (c_\beta U_{c2,2} V_{1,1} - s_\beta U_{c2,1} V_{1,2}) + \delta Z_{2,c1}^{\chi,R} (c_\beta U_{c2,2} V_{2,1} - s_\beta U_{c2,1} V_{2,2}) \right) - \\ & V_{c1,1} \left(U_{c2,2} (\delta Z_{AG} s_\beta s_W + c_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{GG}))) - c_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,2} \right) \right) - \\ & V_{c1,2} \left(U_{c2,1} (c_\beta \delta Z_{AG} s_W - s_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{GG}))) + s_\beta s_W \left(\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,1} \right) \right) \end{aligned} \right\} \end{aligned} \right]
\end{aligned}$$

[FFS] 2 Leptons – Higgs

$$\begin{aligned}
C_{183}(e_{j1}, \bar{e}_{j2}, h^0) &= \left[\begin{aligned} & \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^e M_W^2 s_\alpha s_W - \\ & m_{e_{j1}} \left\{ \begin{aligned} & s_\alpha (2\delta c_\beta M_W^2 s_W + c_\beta (\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W))) + \\ & c_\beta M_W^2 s_W (c_\alpha \delta Z_{hH} - s_\alpha (\delta \bar{Z}_{j2,j2}^{e,R} + \delta Z_{hh} + \delta Z_{j1,j1}^{e,L})) \end{aligned} \right\} \end{aligned} \right\} \\ & \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^e M_W^2 s_\alpha s_W - \\ & m_{e_{j1}} \left\{ \begin{aligned} & s_\alpha (2\delta c_\beta M_W^2 s_W + c_\beta (\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W))) + \\ & c_\beta M_W^2 s_W (c_\alpha \delta Z_{hH} - s_\alpha (\delta \bar{Z}_{j2,j2}^{e,L} + \delta Z_{hh} + \delta Z_{j1,j1}^{e,R})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right]
\end{aligned}$$

$$\begin{aligned}
C(e_{j1}, \bar{e}_{j2}, A^0) &= \left[\begin{aligned} &\frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} &\delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ &m_{e_{j1}} \left\{ \begin{aligned} &M_W^2 s_{2\beta} (\delta s_W - \delta Z_e s_W) + \\ &s_W \left(s_\beta (c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2) + c_\beta M_W^2 (c_\beta \delta Z_{AG} - s_\beta (\delta \bar{Z}_{j2,j2}^{e,R} + \delta Z_{AA} + \delta Z_{j1,j1}^{e,L})) \right) \end{aligned} \right\} \end{aligned} \right\} \\ &-\frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} &\delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ &m_{e_{j1}} \left\{ \begin{aligned} &M_W^2 s_{2\beta} (\delta s_W - \delta Z_e s_W) + \\ &s_W \left(s_\beta (c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2) + c_\beta M_W^2 (c_\beta \delta Z_{AG} - s_\beta (\delta \bar{Z}_{j2,j2}^{e,L} + \delta Z_{AA} + \delta Z_{j1,j1}^{e,R})) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right] \\
C(e_{j1}, \bar{e}_{j2}, G^0) &= \left[\begin{aligned} &-\frac{e \delta_{j1,j2}}{4 c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} &2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ &m_{e_{j1}} \left(c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{e,R} + 2 \delta Z_e + \delta Z_{GG} + \delta Z_{j1,j1}^{e,L})) \right) \end{aligned} \right\} \\ &\frac{e \delta_{j1,j2}}{4 c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} &2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ &m_{e_{j1}} \left(c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{e,L} + 2 \delta Z_e + \delta Z_{GG} + \delta Z_{j1,j1}^{e,R})) \right) \end{aligned} \right\} \end{aligned} \right] \\
C(\nu_{j1}, \bar{e}_{j2}, H^-) &= \left[\begin{aligned} &\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} &\delta m_{j2}^e M_W^2 s_{2\beta} s_W - \\ &m_{e_{j2}} \left\{ \begin{aligned} &M_W^2 s_{2\beta} (\delta s_W - \delta Z_e s_W) + \\ &s_W \left(s_\beta (c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2) + c_\beta M_W^2 (c_\beta \delta Z_{G^-H^-} - s_\beta (\delta \bar{Z}_{j2,j2}^{e,R} + \delta Z_{H^-H^-} + \delta Z_{j1,j1}^{\nu,L})) \right) \end{aligned} \right\} \end{aligned} \right\} \\ &0 \end{aligned} \right] \\
C(\nu_{j1}, \bar{e}_{j2}, G^-) &= \left[\begin{aligned} &-\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} &2 c_\beta \delta m_{j2}^e M_W^2 s_W - \\ &m_{e_{j2}} \left(c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{H^-G^-} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{e,R} + 2 \delta Z_e + \delta Z_{G^-G^-} + \delta Z_{j1,j1}^{\nu,L})) \right) \end{aligned} \right\} \\ &0 \end{aligned} \right] \\
C(e_{j1}, \bar{\nu}_{j2}, H^+) &= \left[\begin{aligned} &0 \\ &\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} &\delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ &m_{e_{j1}} \left\{ \begin{aligned} &c_\beta^2 \delta Z_{G^-H^-}^* M_W^2 s_W + \\ &s_\beta \left(M_W^2 s_W (2 \delta c_\beta - c_\beta (\delta \bar{Z}_{H^-H^-} + \delta \bar{Z}_{j2,j2}^{\nu,L} + 2 \delta Z_e + \delta Z_{j1,j1}^{e,R})) + c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right]
\end{aligned}$$

$$0$$

$$C(e_{j1}, \bar{\nu}_{j2}, G^+) = \left[-\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta M_W^3 s_W^2} \left\{ \begin{array}{l} 2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ m_{e_{j1}} \left(c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{G^- H^-} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{\nu,L} + 2 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{j1,j1}^{e,R})) \right) \end{array} \right\} \right]$$

$$C(e_{j1}, \bar{e}_{j2}, H^0) = \left[-\frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{array}{l} 2 c_\alpha c_\beta \delta m_{j1}^e M_W^2 s_W - \\ m_{e_{j1}} \left\{ \begin{array}{l} 2 c_\alpha \delta c_\beta M_W^2 s_W + \\ c_\beta (M_W^2 s_W (\delta Z_{hH} s_\alpha - c_\alpha (\delta \bar{Z}_{j2,j2}^{e,R} + \delta Z_{HH} + \delta Z_{j1,j1}^{e,L}))) + c_\alpha (\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W)) \end{array} \right\} \end{array} \right\} \right]$$

$$C(e_{j1}, \bar{e}_{j2}, H^0) = \left[-\frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{array}{l} 2 c_\alpha c_\beta \delta m_{j1}^e M_W^2 s_W - \\ m_{e_{j1}} \left\{ \begin{array}{l} 2 c_\alpha \delta c_\beta M_W^2 s_W + \\ c_\beta (M_W^2 s_W (\delta Z_{hH} s_\alpha - c_\alpha (\delta \bar{Z}_{j2,j2}^{e,L} + \delta Z_{HH} + \delta Z_{j1,j1}^{e,R}))) + c_\alpha (\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W)) \end{array} \right\} \end{array} \right\} \right]$$

$$C(\tilde{\chi}_{n2}^0, \tilde{\chi}_{n1}^0, h^0) =$$

$$\left[\begin{aligned} & -\frac{ie}{4s_W^2} \left\{ \frac{2}{c_W^3} \left\{ \begin{aligned} & (s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) (c_W^3 Z_{n2,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1}^* (c_W^2 \delta Z_e + \delta s_W s_W)) + \\ & (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) (c_W^3 Z_{n1,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1}^* (c_W^2 \delta Z_e + \delta s_W s_W)) \end{aligned} \right\} + \right. \\ & \left. \frac{s_W}{c_W} \left\{ \begin{aligned} & \delta \bar{Z}_{n2,1}^{\chi^0,R} \left((s_\alpha Z_{1,3}^* + c_\alpha Z_{1,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0,R} \left((s_\alpha Z_{2,3}^* + c_\alpha Z_{2,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0,R} \left((s_\alpha Z_{3,3}^* + c_\alpha Z_{3,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0,R} \left((s_\alpha Z_{4,3}^* + c_\alpha Z_{4,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) \right) + \\ & \delta Z_{1,n1}^{\chi^0,L} \left((s_\alpha Z_{1,3}^* + c_\alpha Z_{1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{2,n1}^{\chi^0,L} \left((s_\alpha Z_{2,3}^* + c_\alpha Z_{2,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{3,n1}^{\chi^0,L} \left((s_\alpha Z_{3,3}^* + c_\alpha Z_{3,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{4,n1}^{\chi^0,L} \left((s_\alpha Z_{4,3}^* + c_\alpha Z_{4,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{hh} \left((s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) \right) - \\ & \delta Z_{hH} \left((c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^*) \right) \end{aligned} \right\} \right. \\ & \left. -\frac{ie}{4c_W^3 s_W^2} \left\{ 2 \left\{ \begin{aligned} & (s_\alpha Z_{n1,3} + c_\alpha Z_{n1,4}) (c_W^3 Z_{n2,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1} (c_W^2 \delta Z_e + \delta s_W s_W)) + \\ & (s_\alpha Z_{n2,3} + c_\alpha Z_{n2,4}) (c_W^3 Z_{n1,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1} (c_W^2 \delta Z_e + \delta s_W s_W)) \end{aligned} \right\} + \right. \\ & \left. c_W^2 s_W \left\{ \begin{aligned} & \delta \bar{Z}_{n2,1}^{\chi^0,L} \left((s_\alpha Z_{1,3} + c_\alpha Z_{1,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (s_\alpha Z_{n1,3} + c_\alpha Z_{n1,4}) \right) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0,L} \left((s_\alpha Z_{2,3} + c_\alpha Z_{2,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (s_\alpha Z_{n1,3} + c_\alpha Z_{n1,4}) \right) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0,L} \left((s_\alpha Z_{3,3} + c_\alpha Z_{3,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (s_\alpha Z_{n1,3} + c_\alpha Z_{n1,4}) \right) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0,L} \left((s_\alpha Z_{4,3} + c_\alpha Z_{4,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (s_\alpha Z_{n1,3} + c_\alpha Z_{n1,4}) \right) + \\ & (s_W Z_{n2,1} - c_W Z_{n2,2}) (Z_{n1,4} (c_\alpha \delta Z_{hh} + \delta Z_{hH} s_\alpha) - Z_{n1,3} (c_\alpha \delta Z_{hH} - \delta Z_{hh} s_\alpha)) + \\ & (s_W Z_{n1,1} - c_W Z_{n1,2}) (Z_{n2,4} (c_\alpha \delta Z_{hh} + \delta Z_{hH} s_\alpha) - Z_{n2,3} (c_\alpha \delta Z_{hH} - \delta Z_{hh} s_\alpha)) + \\ & \delta Z_{1,n1}^{\chi^0,R} \left((s_\alpha Z_{1,3} + c_\alpha Z_{1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (s_\alpha Z_{n2,3} + c_\alpha Z_{n2,4}) \right) + \\ & \delta Z_{2,n1}^{\chi^0,R} \left((s_\alpha Z_{2,3} + c_\alpha Z_{2,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (s_\alpha Z_{n2,3} + c_\alpha Z_{n2,4}) \right) + \\ & \delta Z_{3,n1}^{\chi^0,R} \left((s_\alpha Z_{3,3} + c_\alpha Z_{3,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (s_\alpha Z_{n2,3} + c_\alpha Z_{n2,4}) \right) + \\ & \delta Z_{4,n1}^{\chi^0,R} \left((s_\alpha Z_{4,3} + c_\alpha Z_{4,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (s_\alpha Z_{n2,3} + c_\alpha Z_{n2,4}) \right) \end{aligned} \right\} \right\} \right] \end{aligned}$$

$$C(\tilde{\chi}_{n2}^0, \tilde{\chi}_{n1}^0, H^0) =$$

$$\begin{aligned}
& \left[\frac{ie}{4s_W^2} \left\{ \frac{2}{c_W^3} \left\{ \begin{aligned} & \left(c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^* \right) \left(c_W^3 Z_{n2,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1}^* (c_W^2 \delta Z_e + \delta s_W s_W) \right) + \right. \\ & \left. \left(c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^* \right) \left(c_W^3 Z_{n1,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1}^* (c_W^2 \delta Z_e + \delta s_W s_W) \right) \right\} + \right. \\ & \left. \frac{s_W}{c_W} \left\{ \begin{aligned} & \delta \bar{Z}_{n2,1}^{\chi^0, R} \left((c_\alpha Z_{1,3}^* - s_\alpha Z_{1,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0, R} \left((c_\alpha Z_{2,3}^* - s_\alpha Z_{2,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0, R} \left((c_\alpha Z_{3,3}^* - s_\alpha Z_{3,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0, R} \left((c_\alpha Z_{4,3}^* - s_\alpha Z_{4,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^*) \right) + \\ & \delta Z_{1,n1}^{\chi^0, L} \left((c_\alpha Z_{1,3}^* - s_\alpha Z_{1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{2,n1}^{\chi^0, L} \left((c_\alpha Z_{2,3}^* - s_\alpha Z_{2,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{3,n1}^{\chi^0, L} \left((c_\alpha Z_{3,3}^* - s_\alpha Z_{3,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{4,n1}^{\chi^0, L} \left((c_\alpha Z_{4,3}^* - s_\alpha Z_{4,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^*) \right) - \\ & \delta Z_{hH} \left((s_\alpha Z_{n1,3}^* + c_\alpha Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (s_\alpha Z_{n2,3}^* + c_\alpha Z_{n2,4}^*) \right) + \\ & \delta Z_{HH} \left((c_\alpha Z_{n1,3}^* - s_\alpha Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (c_\alpha Z_{n2,3}^* - s_\alpha Z_{n2,4}^*) \right) \end{aligned} \right\} \right\} \\ \\ & \frac{ie}{4c_W^3 s_W^2} \left\{ 2 \left\{ \begin{aligned} & (c_\alpha Z_{n1,3} - s_\alpha Z_{n1,4}) (c_W^3 Z_{n2,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1} (c_W^2 \delta Z_e + \delta s_W s_W)) + \\ & (c_\alpha Z_{n2,3} - s_\alpha Z_{n2,4}) (c_W^3 Z_{n1,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1} (c_W^2 \delta Z_e + \delta s_W s_W)) \end{aligned} \right\} + \right. \\ & \left. c_W^2 s_W \left\{ \begin{aligned} & \delta \bar{Z}_{n2,1}^{\chi^0, L} ((c_\alpha Z_{1,3} - s_\alpha Z_{1,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (c_\alpha Z_{n1,3} - s_\alpha Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0, L} ((c_\alpha Z_{2,3} - s_\alpha Z_{2,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (c_\alpha Z_{n1,3} - s_\alpha Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0, L} ((c_\alpha Z_{3,3} - s_\alpha Z_{3,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (c_\alpha Z_{n1,3} - s_\alpha Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0, L} ((c_\alpha Z_{4,3} - s_\alpha Z_{4,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (c_\alpha Z_{n1,3} - s_\alpha Z_{n1,4})) - \\ & \delta Z_{hH} ((s_\alpha Z_{n1,3} + c_\alpha Z_{n1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{n1,1} - c_W Z_{n1,2}) (s_\alpha Z_{n2,3} + c_\alpha Z_{n2,4})) + \\ & \delta Z_{1,n1}^{\chi^0, R} ((c_\alpha Z_{1,3} - s_\alpha Z_{1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (c_\alpha Z_{n2,3} - s_\alpha Z_{n2,4})) + \\ & \delta Z_{2,n1}^{\chi^0, R} ((c_\alpha Z_{2,3} - s_\alpha Z_{2,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (c_\alpha Z_{n2,3} - s_\alpha Z_{n2,4})) + \\ & \delta Z_{3,n1}^{\chi^0, R} ((c_\alpha Z_{3,3} - s_\alpha Z_{3,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (c_\alpha Z_{n2,3} - s_\alpha Z_{n2,4})) + \\ & \delta Z_{4,n1}^{\chi^0, R} ((c_\alpha Z_{4,3} - s_\alpha Z_{4,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (c_\alpha Z_{n2,3} - s_\alpha Z_{n2,4})) + \\ & \delta Z_{HH} ((c_\alpha Z_{n1,3} - s_\alpha Z_{n1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{n1,1} - c_W Z_{n1,2}) (c_\alpha Z_{n2,3} - s_\alpha Z_{n2,4})) \end{aligned} \right\} \right\} \end{aligned}
\right]
\end{aligned}$$

$$C(\tilde{\chi}_{n2}^0, \tilde{\chi}_{n1}^0, A^0) =$$

$$\left[\begin{aligned} & \frac{e}{4 c_W^3 s_W^2} \left\{ c_W^2 s_W \left[\begin{aligned} & \left(2 s_\beta Z_{n1,3}^* - 2 c_\beta Z_{n1,4}^* \right) \left(c_W^3 Z_{n2,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1}^* (c_W^2 \delta Z_e + \delta s_W s_W) \right) + \right. \\ & 2 \left(s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^* \right) \left(c_W^3 Z_{n1,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1}^* (c_W^2 \delta Z_e + \delta s_W s_W) \right) + \\ & \delta \bar{Z}_{n2,1}^{\chi^0, R} \left((s_\beta Z_{1,3}^* - c_\beta Z_{1,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (s_\beta Z_{n1,3}^* - c_\beta Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0, R} \left((s_\beta Z_{2,3}^* - c_\beta Z_{2,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (s_\beta Z_{n1,3}^* - c_\beta Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0, R} \left((s_\beta Z_{3,3}^* - c_\beta Z_{3,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (s_\beta Z_{n1,3}^* - c_\beta Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0, R} \left((s_\beta Z_{4,3}^* - c_\beta Z_{4,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (s_\beta Z_{n1,3}^* - c_\beta Z_{n1,4}^*) \right) + \\ & \delta Z_{1,n1}^{\chi^0, L} \left((s_\beta Z_{1,3}^* - c_\beta Z_{1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{2,n1}^{\chi^0, L} \left((s_\beta Z_{2,3}^* - c_\beta Z_{2,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{3,n1}^{\chi^0, L} \left((s_\beta Z_{3,3}^* - c_\beta Z_{3,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{4,n1}^{\chi^0, L} \left((s_\beta Z_{4,3}^* - c_\beta Z_{4,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{AA} \left((s_\beta Z_{n1,3}^* - c_\beta Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^*) \right) - \\ & \delta Z_{AG} \left((c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^*) \right) \end{aligned} \right\} \\ & - \frac{e}{4 c_W^3 s_W^2} \left\{ c_W^2 s_W \left[\begin{aligned} & (2 s_\beta Z_{n1,3} - 2 c_\beta Z_{n1,4}) (c_W^3 Z_{n2,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1} (c_W^2 \delta Z_e + \delta s_W s_W)) + \\ & 2 (s_\beta Z_{n2,3} - c_\beta Z_{n2,4}) (c_W^3 Z_{n1,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1} (c_W^2 \delta Z_e + \delta s_W s_W)) + \\ & \delta \bar{Z}_{n2,1}^{\chi^0, L} ((s_\beta Z_{1,3} - c_\beta Z_{1,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (s_\beta Z_{n1,3} - c_\beta Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0, L} ((s_\beta Z_{2,3} - c_\beta Z_{2,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (s_\beta Z_{n1,3} - c_\beta Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0, L} ((s_\beta Z_{3,3} - c_\beta Z_{3,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (s_\beta Z_{n1,3} - c_\beta Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0, L} ((s_\beta Z_{4,3} - c_\beta Z_{4,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (s_\beta Z_{n1,3} - c_\beta Z_{n1,4})) - \\ & (s_W Z_{n2,1} - c_W Z_{n2,2}) (Z_{n1,4} (c_\beta \delta Z_{AA} + \delta Z_{AG} s_\beta) + Z_{n1,3} (c_\beta \delta Z_{AG} - \delta Z_{AA} s_\beta)) - \\ & (s_W Z_{n1,1} - c_W Z_{n1,2}) (Z_{n2,4} (c_\beta \delta Z_{AA} + \delta Z_{AG} s_\beta) + Z_{n2,3} (c_\beta \delta Z_{AG} - \delta Z_{AA} s_\beta)) + \\ & \delta Z_{1,n1}^{\chi^0, R} ((s_\beta Z_{1,3} - c_\beta Z_{1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (s_\beta Z_{n2,3} - c_\beta Z_{n2,4})) + \\ & \delta Z_{2,n1}^{\chi^0, R} ((s_\beta Z_{2,3} - c_\beta Z_{2,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (s_\beta Z_{n2,3} - c_\beta Z_{n2,4})) + \\ & \delta Z_{3,n1}^{\chi^0, R} ((s_\beta Z_{3,3} - c_\beta Z_{3,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (s_\beta Z_{n2,3} - c_\beta Z_{n2,4})) + \\ & \delta Z_{4,n1}^{\chi^0, R} ((s_\beta Z_{4,3} - c_\beta Z_{4,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (s_\beta Z_{n2,3} - c_\beta Z_{n2,4})) \end{aligned} \right\} \end{aligned} \right]$$

$$C(\tilde{\chi}_{n2}^0, \tilde{\chi}_{n1}^0, G^0) =$$

$$\left[-\frac{e}{4c_W^3 s_W^2} \left\{ c_W^2 s_W \left\{ 2 \left\{ \begin{aligned} & \left(c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^* \right) \left(c_W^3 Z_{n2,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1}^* (c_W^2 \delta Z_e + \delta s_W s_W) \right) + \right. \\ & \left. \left(c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^* \right) \left(c_W^3 Z_{n1,2}^* (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1}^* (c_W^2 \delta Z_e + \delta s_W s_W) \right) \right\} + \right. \\ & \left. \begin{aligned} & \delta \bar{Z}_{n2,1}^{\chi^0,R} \left((c_\beta Z_{1,3}^* + s_\beta Z_{1,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0,R} \left((c_\beta Z_{2,3}^* + s_\beta Z_{2,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0,R} \left((c_\beta Z_{3,3}^* + s_\beta Z_{3,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^*) \right) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0,R} \left((c_\beta Z_{4,3}^* + s_\beta Z_{4,4}^*) (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^*) \right) + \\ & \delta Z_{1,n1}^{\chi^0,L} \left((c_\beta Z_{1,3}^* + s_\beta Z_{1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{1,1}^* - c_W Z_{1,2}^*) (c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{2,n1}^{\chi^0,L} \left((c_\beta Z_{2,3}^* + s_\beta Z_{2,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{2,1}^* - c_W Z_{2,2}^*) (c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{3,n1}^{\chi^0,L} \left((c_\beta Z_{3,3}^* + s_\beta Z_{3,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{3,1}^* - c_W Z_{3,2}^*) (c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{4,n1}^{\chi^0,L} \left((c_\beta Z_{4,3}^* + s_\beta Z_{4,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{4,1}^* - c_W Z_{4,2}^*) (c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^*) \right) - \\ & \delta Z_{AG} \left((s_\beta Z_{n1,3}^* - c_\beta Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (s_\beta Z_{n2,3}^* - c_\beta Z_{n2,4}^*) \right) + \\ & \delta Z_{GG} \left((c_\beta Z_{n1,3}^* + s_\beta Z_{n1,4}^*) (s_W Z_{n2,1}^* - c_W Z_{n2,2}^*) + (s_W Z_{n1,1}^* - c_W Z_{n1,2}^*) (c_\beta Z_{n2,3}^* + s_\beta Z_{n2,4}^*) \right) \end{aligned} \right\} \right\} + \right. \\ \left. \frac{e}{4c_W^3 s_W^2} \left\{ c_W^2 s_W \left\{ 2 \left\{ \begin{aligned} & (c_\beta Z_{n1,3} + s_\beta Z_{n1,4}) (c_W^3 Z_{n2,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n2,1} (c_W^2 \delta Z_e + \delta s_W s_W)) + \right. \\ & (c_\beta Z_{n2,3} + s_\beta Z_{n2,4}) (c_W^3 Z_{n1,2} (\delta s_W - \delta Z_e s_W) + s_W^2 Z_{n1,1} (c_W^2 \delta Z_e + \delta s_W s_W)) \right\} + \right. \\ & \begin{aligned} & \delta \bar{Z}_{n2,1}^{\chi^0,L} ((c_\beta Z_{1,3} + s_\beta Z_{1,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (c_\beta Z_{n1,3} + s_\beta Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,2}^{\chi^0,L} ((c_\beta Z_{2,3} + s_\beta Z_{2,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (c_\beta Z_{n1,3} + s_\beta Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,3}^{\chi^0,L} ((c_\beta Z_{3,3} + s_\beta Z_{3,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (c_\beta Z_{n1,3} + s_\beta Z_{n1,4})) + \\ & \delta \bar{Z}_{n2,4}^{\chi^0,L} ((c_\beta Z_{4,3} + s_\beta Z_{4,4}) (s_W Z_{n1,1} - c_W Z_{n1,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (c_\beta Z_{n1,3} + s_\beta Z_{n1,4})) - \\ & \delta Z_{AG} ((s_\beta Z_{n1,3} - c_\beta Z_{n1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{n1,1} - c_W Z_{n1,2}) (s_\beta Z_{n2,3} - c_\beta Z_{n2,4})) + \\ & \delta Z_{1,n1}^{\chi^0,R} ((c_\beta Z_{1,3} + s_\beta Z_{1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{1,1} - c_W Z_{1,2}) (c_\beta Z_{n2,3} + s_\beta Z_{n2,4})) + \\ & \delta Z_{2,n1}^{\chi^0,R} ((c_\beta Z_{2,3} + s_\beta Z_{2,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{2,1} - c_W Z_{2,2}) (c_\beta Z_{n2,3} + s_\beta Z_{n2,4})) + \\ & \delta Z_{3,n1}^{\chi^0,R} ((c_\beta Z_{3,3} + s_\beta Z_{3,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{3,1} - c_W Z_{3,2}) (c_\beta Z_{n2,3} + s_\beta Z_{n2,4})) + \\ & \delta Z_{4,n1}^{\chi^0,R} ((c_\beta Z_{4,3} + s_\beta Z_{4,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{4,1} - c_W Z_{4,2}) (c_\beta Z_{n2,3} + s_\beta Z_{n2,4})) + \\ & \delta Z_{GG} ((c_\beta Z_{n1,3} + s_\beta Z_{n1,4}) (s_W Z_{n2,1} - c_W Z_{n2,2}) + (s_W Z_{n1,1} - c_W Z_{n1,2}) (c_\beta Z_{n2,3} + s_\beta Z_{n2,4})) \end{aligned} \right\} \right\} \right\} \right] \end{aligned}$$

[FFS] 2 Quarks – Higgs

$$C(u_{j1}, \bar{u}_{j2}, h^0) = \left[\begin{array}{l} -\frac{i e \delta_{j1,j2}}{4 M_W^3 s_\beta^2 s_W^2} \left\{ 2 c_\alpha \delta m_{j1}^u M_W^2 s_\beta s_W + \right. \\ \left. m_{u_{j1}} \left(\delta Z_{hH} M_W^2 s_\alpha s_\beta s_W - c_\alpha \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{j2,j2}^{u,R} + 2 \delta Z_e + \delta Z_{hh} + \delta Z_{j1,j1}^{u,L} \right) \right) + 2 M_W^2 (\delta s_W s_\beta + \delta s_\beta s_W) \right) \right) \right\} \\ -\frac{i e \delta_{j1,j2}}{4 M_W^3 s_\beta^2 s_W^2} \left\{ 2 c_\alpha \delta m_{j1}^u M_W^2 s_\beta s_W + \right. \\ \left. m_{u_{j1}} \left(\delta Z_{hH} M_W^2 s_\alpha s_\beta s_W - c_\alpha \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{j2,j2}^{u,L} + 2 \delta Z_e + \delta Z_{hh} + \delta Z_{j1,j1}^{u,R} \right) \right) + 2 M_W^2 (\delta s_W s_\beta + \delta s_\beta s_W) \right) \right) \right\} \end{array} \right]$$

$$C(d_{j1}, \bar{d}_{j2}, h^0) = \left[\begin{array}{l} \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ 2 c_\beta \delta m_{j1}^d M_W^2 s_\alpha s_W - \right. \\ \left. m_{d_{j1}} \left\{ s_\alpha \left(2 \delta c_\beta M_W^2 s_W + c_\beta \left(\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W) \right) \right) + \right. \right. \\ \left. \left. c_\beta M_W^2 s_W \left(c_\alpha \delta Z_{hH} - s_\alpha \left(\delta \bar{Z}_{j2,j2}^{d,R} + \delta Z_{hh} + \delta Z_{j1,j1}^{d,L} \right) \right) \right\} \right\} \\ \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ 2 c_\beta \delta m_{j1}^d M_W^2 s_\alpha s_W - \right. \\ \left. m_{d_{j1}} \left\{ s_\alpha \left(2 \delta c_\beta M_W^2 s_W + c_\beta \left(\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W) \right) \right) + \right. \right. \\ \left. \left. c_\beta M_W^2 s_W \left(c_\alpha \delta Z_{hH} - s_\alpha \left(\delta \bar{Z}_{j2,j2}^{d,L} + \delta Z_{hh} + \delta Z_{j1,j1}^{d,R} \right) \right) \right\} \right\} \end{array} \right]$$

$$C(u_{j1}, \bar{u}_{j2}, A^0) = \left[\begin{array}{l} \frac{e \delta_{j1,j2}}{8 M_W^3 s_\beta^2 s_W^2} \left\{ 2 \delta m_{j1}^u M_W^2 s_{2\beta} s_W - \right. \\ \left. m_{u_{j1}} \left(s_{2\beta} \left(\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W) \right) + M_W^2 s_W \left(4 c_\beta \delta s_\beta - 2 \delta Z_{AG} s_\beta^2 - s_{2\beta} \left(\delta \bar{Z}_{j2,j2}^{u,R} + \delta Z_{AA} + \delta Z_{j1,j1}^{u,L} \right) \right) \right) \right\} \\ -\frac{e \delta_{j1,j2}}{8 M_W^3 s_\beta^2 s_W^2} \left\{ 2 \delta m_{j1}^u M_W^2 s_{2\beta} s_W - \right. \\ \left. m_{u_{j1}} \left(s_{2\beta} \left(\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W) \right) + M_W^2 s_W \left(4 c_\beta \delta s_\beta - 2 \delta Z_{AG} s_\beta^2 - s_{2\beta} \left(\delta \bar{Z}_{j2,j2}^{u,L} + \delta Z_{AA} + \delta Z_{j1,j1}^{u,R} \right) \right) \right) \right\} \end{array} \right]$$

$$C(u_{j1}, \bar{u}_{j2}, G^0) = \left[\begin{array}{l} \frac{e \delta_{j1,j2}}{4 M_W^3 s_\beta s_W^2} \left\{ 2 \delta m_{j1}^u M_W^2 s_\beta s_W - \right. \\ \left. m_{u_{j1}} \left(s_W \left(\delta M_W^2 s_\beta + 2 M_W^2 (\delta s_\beta - \delta Z_e s_\beta) \right) + M_W^2 \left(2 \delta s_W s_\beta - s_W \left(c_\beta \delta Z_{AG} + s_\beta \left(\delta \bar{Z}_{j2,j2}^{u,R} + \delta Z_{GG} + \delta Z_{j1,j1}^{u,L} \right) \right) \right) \right) \right\} \\ -\frac{e \delta_{j1,j2}}{4 M_W^3 s_\beta s_W^2} \left\{ 2 \delta m_{j1}^u M_W^2 s_\beta s_W - \right. \\ \left. m_{u_{j1}} \left(s_W \left(\delta M_W^2 s_\beta + 2 M_W^2 (\delta s_\beta - \delta Z_e s_\beta) \right) + M_W^2 \left(2 \delta s_W s_\beta - s_W \left(c_\beta \delta Z_{AG} + s_\beta \left(\delta \bar{Z}_{j2,j2}^{u,L} + \delta Z_{GG} + \delta Z_{j1,j1}^{u,R} \right) \right) \right) \right) \right\} \end{array} \right]$$

$$\begin{aligned}
C(d_{j1}, \bar{d}_{j2}, A^0) = & \left[\begin{aligned} & \frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \\ & m_{d_{j1}} \left\{ \begin{aligned} & M_W^2 s_{2\beta} (\delta s_W - \delta Z_e s_W) + \\ & s_W \left(s_\beta (c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2) + c_\beta M_W^2 (c_\beta \delta Z_{AG} - s_\beta (\delta \bar{Z}_{j2,j2}^{d,R} + \delta Z_{AA} + \delta Z_{j1,j1}^{d,L})) \right) \end{aligned} \right\} \end{aligned} \right\} \\ & - \frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \\ & m_{d_{j1}} \left\{ \begin{aligned} & M_W^2 s_{2\beta} (\delta s_W - \delta Z_e s_W) + \\ & s_W \left(s_\beta (c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2) + c_\beta M_W^2 (c_\beta \delta Z_{AG} - s_\beta (\delta \bar{Z}_{j2,j2}^{d,L} + \delta Z_{AA} + \delta Z_{j1,j1}^{d,R})) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right] \\
C(d_{j1}, \bar{d}_{j2}, G^0) = & \left[\begin{aligned} & - \frac{e \delta_{j1,j2}}{4 c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_{j1}} \left(c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{d,R} + 2 \delta Z_e + \delta Z_{GG} + \delta Z_{j1,j1}^{d,L})) \right) \end{aligned} \right\} \\ & \frac{e \delta_{j1,j2}}{4 c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_{j1}} \left(c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{d,L} + 2 \delta Z_e + \delta Z_{GG} + \delta Z_{j1,j1}^{d,R})) \right) \end{aligned} \right\} \end{aligned} \right] \\
C(u_{j1}, \bar{u}_{j2}, H^0) = & \left[\begin{aligned} & - \frac{i e \delta_{j1,j2}}{4 M_W^3 s_\beta^2 s_W^2} \left\{ \begin{aligned} & 2 \delta m_{j1}^u M_W^2 s_\alpha s_\beta s_W - \\ & m_{u_{j1}} \left\{ \begin{aligned} & s_\alpha (2 \delta s_W M_W^2 s_\beta + s_W (\delta M_W^2 s_\beta + 2 M_W^2 (\delta s_\beta - \delta Z_e s_\beta))) - \\ & M_W^2 s_\beta s_W (c_\alpha \delta Z_{hH} + s_\alpha (\delta \bar{Z}_{j2,j2}^{u,R} + \delta Z_{HH} + \delta Z_{j1,j1}^{u,L})) \end{aligned} \right\} \end{aligned} \right\} \\ & - \frac{i e \delta_{j1,j2}}{4 M_W^3 s_\beta^2 s_W^2} \left\{ \begin{aligned} & 2 \delta m_{j1}^u M_W^2 s_\alpha s_\beta s_W - \\ & m_{u_{j1}} \left\{ \begin{aligned} & s_\alpha (2 \delta s_W M_W^2 s_\beta + s_W (\delta M_W^2 s_\beta + 2 M_W^2 (\delta s_\beta - \delta Z_e s_\beta))) - \\ & M_W^2 s_\beta s_W (c_\alpha \delta Z_{hH} + s_\alpha (\delta \bar{Z}_{j2,j2}^{u,L} + \delta Z_{HH} + \delta Z_{j1,j1}^{u,R})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right] \\
C(d_{j1}, \bar{d}_{j2}, H^0) = & \left[\begin{aligned} & - \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\alpha c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_{j1}} \left\{ \begin{aligned} & 2 c_\alpha \delta c_\beta M_W^2 s_W + \\ & c_\beta (M_W^2 s_W (\delta Z_{hH} s_\alpha - c_\alpha (\delta \bar{Z}_{j2,j2}^{d,R} + \delta Z_{HH} + \delta Z_{j1,j1}^{d,L})) + c_\alpha (\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W))) \end{aligned} \right\} \end{aligned} \right\} \\ & - \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\alpha c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_{j1}} \left\{ \begin{aligned} & 2 c_\alpha \delta c_\beta M_W^2 s_W + \\ & c_\beta (M_W^2 s_W (\delta Z_{hH} s_\alpha - c_\alpha (\delta \bar{Z}_{j2,j2}^{d,L} + \delta Z_{HH} + \delta Z_{j1,j1}^{d,R})) + c_\alpha (\delta M_W^2 s_W + 2 M_W^2 (\delta s_W - \delta Z_e s_W))) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right]
\end{aligned}$$

$$\begin{aligned}
C(u_{j1}, \bar{d}_{j2}, H^-) = & \left[\begin{aligned} & \frac{ie}{2\sqrt{2}c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & \delta \text{CKM}_{j1,j2}^* m_{d_{j2}} M_W^2 s_{2\beta} s_W + \\ & \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & \delta m_{j2}^d M_W^2 s_{2\beta} s_W - \\ & m_{d_{j2}} \left\{ \begin{aligned} & M_W^2 s_{2\beta} (\delta s_W - \delta Z_e s_W) + \\ & s_W \left(s_\beta (c_\beta \delta M_W^2 + 2\delta c_\beta M_W^2) + c_\beta M_W^2 (c_\beta \delta Z_{G^-H^-} - s_\beta (\delta \bar{Z}_{j2,j2}^{d,R} + \delta Z_{H^-H^-} + \delta Z_{j1,j1}^{u,L})) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right. \\ & \frac{ie}{4\sqrt{2}M_W^3 s_\beta^2 s_W^2} \left\{ \begin{aligned} & 2\delta \text{CKM}_{j1,j2}^* m_{u_{j1}} M_W^2 s_{2\beta} s_W + \\ & \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & 2\delta m_{j1}^u M_W^2 s_{2\beta} s_W - \\ & m_{u_{j1}} \left\{ \begin{aligned} & s_{2\beta} (\delta M_W^2 s_W + 2M_W^2 (\delta s_W - \delta Z_e s_W)) + \\ & M_W^2 s_W (4c_\beta \delta s_\beta - 2\delta Z_{G^-H^-} s_\beta^2 - s_{2\beta} (\delta \bar{Z}_{j2,j2}^{d,L} + \delta Z_{H^-H^-} + \delta Z_{j1,j1}^{u,R})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right. \end{aligned} \right] \\ \\
C(u_{j1}, \bar{d}_{j2}, G^-) = & \left[\begin{aligned} & -\frac{ie}{2\sqrt{2}c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} & 2c_\beta \delta \text{CKM}_{j1,j2}^* m_{d_{j2}} M_W^2 s_W + \\ & \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & 2c_\beta \delta m_{j2}^d M_W^2 s_W - \\ & m_{d_{j2}} (c_\beta (2\delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2\delta c_\beta + \delta Z_{H^-G^-} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{d,R} + 2\delta Z_e + \delta Z_{G^-G^-} + \delta Z_{j1,j1}^{u,L}))) \end{aligned} \right\} \end{aligned} \right. \\ & \frac{ie}{2\sqrt{2}M_W^3 s_\beta s_W^2} \left\{ \begin{aligned} & 2\delta \text{CKM}_{j1,j2}^* m_{u_{j1}} M_W^2 s_\beta s_W + \\ & \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & 2\delta m_{j1}^u M_W^2 s_\beta s_W - \\ & m_{u_{j1}} \left\{ \begin{aligned} & s_W (\delta M_W^2 s_\beta + 2M_W^2 (\delta s_\beta - \delta Z_e s_\beta)) + \\ & M_W^2 (2\delta s_W s_\beta - s_W (c_\beta \delta Z_{H^-G^-} + s_\beta (\delta \bar{Z}_{j2,j2}^{d,L} + \delta Z_{G^-G^-} + \delta Z_{j1,j1}^{u,R}))) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right. \end{aligned} \right] \\ \\
C(d_{j1}, \bar{u}_{j2}, H^+) = & \left[\begin{aligned} & \frac{ie}{2\sqrt{2}M_W^3 s_\beta^2 s_W^2} \left\{ \begin{aligned} & \delta \text{CKM}_{j2,j1} m_{u_{j2}} M_W^2 s_{2\beta} s_W + \\ & \text{CKM}_{j2,j1} \left\{ \begin{aligned} & \delta m_{j2}^u M_W^2 s_{2\beta} s_W + \\ & m_{u_{j2}} \left\{ \begin{aligned} & \delta Z_{G^-H^-}^* M_W^2 s_\beta^2 s_W - \\ & c_\beta (s_\beta s_W (\delta M_W^2 - M_W^2 (\delta \bar{Z}_{H^-H^-} + \delta \bar{Z}_{j2,j2}^{u,R} + 2\delta Z_e + \delta Z_{j1,j1}^{d,L})) + 2M_W^2 (\delta s_W s_\beta + \delta s_\beta s_W)) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right. \\ & \frac{ie}{2\sqrt{2}c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & \delta \text{CKM}_{j2,j1} m_{d_{j1}} M_W^2 s_{2\beta} s_W + \\ & \text{CKM}_{j2,j1} \left\{ \begin{aligned} & \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \\ & m_{d_{j1}} \left\{ \begin{aligned} & c_\beta^2 \delta Z_{G^-H^-}^* M_W^2 s_W + \\ & s_\beta (M_W^2 s_W (2\delta c_\beta - c_\beta (\delta \bar{Z}_{H^-H^-} + \delta \bar{Z}_{j2,j2}^{u,L} + 2\delta Z_e + \delta Z_{j1,j1}^{d,R})) + c_\beta (2\delta s_W M_W^2 + \delta M_W^2 s_W)) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right. \end{aligned} \right]
\end{aligned}$$

$$C(d_{j1}, \bar{u}_{j2}, G^+) = \begin{bmatrix} \frac{i e}{2 \sqrt{2} M_W^3 s_\beta s_W^2} \left\{ \frac{2 \delta m_{j2}^u M_W^2 \text{CKM}_{j2,j1} s_\beta s_W +}{m_{u_{j2}} \left\{ \begin{aligned} & 2 \delta \text{CKM}_{j2,j1} M_W^2 s_\beta s_W - \\ & \text{CKM}_{j2,j1} \left\{ \begin{aligned} & s_W (\delta M_W^2 s_\beta + 2 M_W^2 (\delta s_\beta - \delta Z_e s_\beta)) + \\ & M_W^2 (2 \delta s_W s_\beta - s_W (c_\beta \delta Z_{G-H^-} + s_\beta (\delta \bar{Z}_{j2,j2}^{u,R} + \delta Z_{G-G^-} + \delta Z_{j1,j1}^{d,L}))) \end{aligned} \right\} \end{aligned} \right\} \right\} \\ - \frac{i e}{2 \sqrt{2} c_\beta M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\beta \delta \text{CKM}_{j2,j1} m_{d_{j1}} M_W^2 s_W + \\ & \text{CKM}_{j2,j1} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_{j1}} (c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W) + M_W^2 s_W (2 \delta c_\beta + \delta Z_{G-H^-} s_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{u,L} + 2 \delta Z_e + \delta Z_{G-G^-} + \delta Z_{j1,j1}^{d,R}))) \end{aligned} \right\} \end{aligned} \right\} \right\} \end{bmatrix}$$

[FFS] Chargino – Lepton – Slepton

$$C(\tilde{\chi}_{c1}^-, \bar{e}_{j2}, \tilde{\nu}_{j1}) = \left[\begin{aligned} & \frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & c_\beta m_{e_{j1}} M_W^2 s_W (\delta Z_{1,c1}^{\chi,L} U_{1,2}^* + \delta Z_{2,c1}^{\chi,L} U_{2,2}^*) + \\ & U_{c1,2}^* (2 c_\beta \delta m_{j1}^e M_W^2 s_W - m_{e_{j1}} (M_W^2 s_W (2 \delta c_\beta - c_\beta (\delta \bar{Z}_{j2,j2}^{e,R} + 2 \delta Z_e + \delta Z_{1,1}^{\nu,j1})) + c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W))) \end{aligned} \right\} \\ & \frac{i e \delta_{j1,j2}}{2 s_W^2} (V_{c1,1} (2 \delta s_W - s_W (\delta \bar{Z}_{j2,j2}^{e,L} + 2 \delta Z_e + \delta Z_{1,1}^{\nu,j1})) - s_W (\delta Z_{1,c1}^{\chi,R} V_{1,1} + \delta Z_{2,c1}^{\chi,R} V_{2,1})) \end{aligned} \right]$$

$$C(\tilde{\chi}_{c1}^+, \bar{\nu}_{j1}, \tilde{e}_{j2}^2) = \left[\begin{aligned} & 0 \\ & \frac{i e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & 2 c_\beta^2 M_W^3 U_{s2,1}^{\tilde{e},j1*} (U_{c1,1} (2 \delta s_W - s_W (\delta \bar{Z}_{j1,j1}^{\nu,L} + 2 \delta Z_e)) - s_W (\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,1})) + \\ & \sqrt{2} U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta m_{e_{j1}} M_W^2 s_W (\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,2}) + \\ & U_{c1,2} (2 c_\beta \delta m_{j1}^e M_W^2 s_W - m_{e_{j1}} (M_W^2 s_W (2 \delta c_\beta - c_\beta (\delta \bar{Z}_{j1,j1}^{\nu,L} + 2 \delta Z_e)) + c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W))) \end{aligned} \right\} \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & 2 c_\beta M_W U_{c1,1} (\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*}) - \\ & \sqrt{2} m_{e_{j1}} U_{c1,2} (\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*}) \end{aligned} \right\} \end{aligned} \right\} - \left\{ \right. \end{aligned} \right]$$

$$C(e_{j2}, \tilde{\chi}_{c1}^+, \tilde{\nu}_{j1}^\dagger) = \left[\begin{aligned} & \frac{i e \delta_{j1,j2}}{2 s_W^2} (V_{c1,1}^* (2 \delta s_W - s_W (\delta \bar{Z}_{1,1}^{\nu,j1} + 2 \delta Z_e + \delta Z_{j2,j2}^{e,L})) - s_W (\delta \bar{Z}_{c1,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c1,2}^{\chi,R} V_{2,1}^*)) \\ & \frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & c_\beta m_{e_{j1}} M_W^2 s_W (\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,2}) + \\ & U_{c1,2} (2 c_\beta \delta m_{j1}^e M_W^2 s_W - m_{e_{j1}} (M_W^2 s_W (2 \delta c_\beta - c_\beta (\delta \bar{Z}_{1,1}^{\nu,j1} + 2 \delta Z_e + \delta Z_{j2,j2}^{e,R}))) + c_\beta (2 \delta s_W M_W^2 + \delta M_W^2 s_W))) \end{aligned} \right\} \end{aligned} \right]$$

$$C(\nu_{11}, \tilde{\chi}_{c1}^-, \tilde{e}_{j2}^{s2,\dagger}) = \left[\frac{ie \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & \sqrt{2} U_{c1,2}^* \left\{ c_\beta m_{e1} M_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) + \right. \\ & U_{s2,2}^{\tilde{e},j1} \left(2 c_\beta \delta m_{j1}^e M_W^2 s_W - m_{e1} \left(M_W^2 s_W \left(2 \delta c_\beta - c_\beta \left(2 \delta Z_e + \delta Z_{j1,j1}^{\nu,L} \right) \right) + c_\beta \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \right) \left. \right\} + \\ & 2 c_\beta^2 M_W^3 U_{c1,1}^* \left(U_{s2,1}^{\tilde{e},j1} \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_{j1,j1}^{\nu,L} \right) \right) - s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) \right) - \\ & c_\beta M_W^2 s_W \left(2 c_\beta M_W U_{s2,1}^{\tilde{e},j1} \left(\delta Z_{1,c1}^{\chi,L} U_{1,1}^* + \delta Z_{2,c1}^{\chi,L} U_{2,1}^* \right) - \sqrt{2} m_{e1} U_{s2,2}^{\tilde{e},j1} \left(\delta Z_{1,c1}^{\chi,L} U_{1,2}^* + \delta Z_{2,c1}^{\chi,L} U_{2,2}^* \right) \right) \end{aligned} \right\} + \right] \\ 0$$

[FFS] Chargino – Neutralino – Higgs

$$C(\tilde{\chi}_{n1}^0, \tilde{\chi}_{c2}^+, H^-) = \left[\begin{aligned} & -\frac{ie}{4 c_W^3 s_W^2} \left\{ \begin{aligned} & \sqrt{2} V_{c2,2}^* \left\{ \begin{aligned} & s_W^2 Z_{n1,1}^* (c_W^2 \delta Z_{G-H-} s_\beta + c_\beta (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{H-H-}))) + \\ & c_W Z_{n1,2}^* (\delta Z_{G-H-} s_\beta s_W - c_\beta (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{H-H-}))) + \\ & c_\beta^2 s_W \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* + c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* + c_W Z_{2,2}^*) + \\ & \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* + c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* + c_W Z_{4,2}^*) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 \left\{ \begin{aligned} & c_\beta s_W \left\{ \begin{aligned} & \delta \bar{Z}_{c2,1}^{\chi,R} \left(2 c_W V_{1,1}^* Z_{n1,4}^* + \sqrt{2} V_{1,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*) \right) + \\ & \delta \bar{Z}_{c2,2}^{\chi,R} \left(2 c_W V_{2,1}^* Z_{n1,4}^* + \sqrt{2} V_{2,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*) \right) \end{aligned} \right\} + \\ & 2 c_W V_{c2,1}^* \left\{ \begin{aligned} & c_\beta s_W (\delta Z_{1,n1}^{\chi^0,L} Z_{1,4}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,4}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,4}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,4}^*) + \\ & Z_{n1,4}^* (\delta Z_{G-H-} s_\beta s_W - c_\beta (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{H-H-}))) \end{aligned} \right\} \end{aligned} \right\} + \\ & \frac{ie}{2 s_W^2} \left\{ \begin{aligned} & s_\beta \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & c_\beta \delta Z_{G-H-} s_W \left(U_{c2,1} Z_{n1,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & \delta s_W \left(2 U_{c2,1} Z_{n1,3} + \sqrt{2} U_{c2,2} \left(\frac{s_W^3 Z_{n1,1}}{c_W^3} - Z_{n1,2} \right) \right) - \\ & \delta Z_{1,n1}^{\chi^0,R} \left(U_{c2,1} Z_{1,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{1,1}}{c_W} + Z_{1,2} \right) \right) + \\ & \delta Z_{2,n1}^{\chi^0,R} \left(U_{c2,1} Z_{2,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{2,1}}{c_W} + Z_{2,2} \right) \right) + \\ & \delta Z_{3,n1}^{\chi^0,R} \left(U_{c2,1} Z_{3,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{3,1}}{c_W} + Z_{3,2} \right) \right) + \\ & \delta Z_{4,n1}^{\chi^0,R} \left(U_{c2,1} Z_{4,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{4,1}}{c_W} + Z_{4,2} \right) \right) + \\ & \delta \bar{Z}_{c2,1}^{\chi,L} \left(U_{1,1} Z_{n1,3} - \frac{U_{1,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & \delta \bar{Z}_{c2,2}^{\chi,L} \left(U_{2,1} Z_{n1,3} - \frac{U_{2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & (2 \delta Z_e + \delta Z_{H-H-}) \left(U_{c2,1} Z_{n1,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right] \end{aligned}$$

$$C(\tilde{\chi}_{n1}^0, \tilde{\chi}_{c2}^+, G^-) =$$

$$\left[-\frac{ie}{4c_W^3 s_W^2} \left\{ \sqrt{2} V_{c2,2}^* \left\{ \begin{aligned} & s_W^2 Z_{n1,1}^* (2\delta s_W s_\beta s_W + c_W^2 (c_\beta \delta Z_{H-G^-} + s_\beta (2\delta Z_e + \delta Z_{G-G^-}))) - \\ & c_W Z_{n1,2}^* (2\delta s_W s_\beta - s_W (c_\beta \delta Z_{H-G^-} + s_\beta (2\delta Z_e + \delta Z_{G-G^-}))) - \\ & c_W^2 \left\{ \begin{aligned} & s_\beta s_W \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* + c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* + c_W Z_{2,2}^*) + \\ & \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* + c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* + c_W Z_{4,2}^*) \end{aligned} \right\} \\ & \delta \bar{Z}_{c2,1}^{\chi,R} (2c_W V_{1,1}^* Z_{n1,4}^* + \sqrt{2} V_{1,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*)) + \\ & \delta \bar{Z}_{c2,2}^{\chi,R} (2c_W V_{2,1}^* Z_{n1,4}^* + \sqrt{2} V_{2,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*)) \end{aligned} \right\} + \\ & 2c_W V_{c2,1}^* \left\{ \begin{aligned} & s_\beta s_W (\delta Z_{1,n1}^{\chi^0,L} Z_{1,4}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,4}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,4}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,4}^*) - \\ & Z_{n1,4}^* (2\delta s_W s_\beta - s_W (c_\beta \delta Z_{H-G^-} + s_\beta (2\delta Z_e + \delta Z_{G-G^-}))) \end{aligned} \right\} \end{aligned} \right\} + \right\} \right] \\ + \left[\frac{ie}{2s_W^2} \left\{ c_\beta \left\{ s_W \left(c_\beta \delta Z_{G-G^-} - \delta Z_{H-G^-} s_\beta \right) \left(U_{c2,1} Z_{n1,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) - \right. \right. \right. \\ \left. \left. \left\{ \begin{aligned} & \delta s_W \left(2U_{c2,1} Z_{n1,3} + \sqrt{2} U_{c2,2} \left(\frac{s_W^3 Z_{n1,1}}{c_W^3} - Z_{n1,2} \right) \right) - \\ & \delta Z_{1,n1}^{\chi^0,R} \left(U_{c2,1} Z_{1,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{1,1}}{c_W} + Z_{1,2} \right) \right) + \\ & \delta Z_{2,n1}^{\chi^0,R} \left(U_{c2,1} Z_{2,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{2,1}}{c_W} + Z_{2,2} \right) \right) + \\ & \delta Z_{3,n1}^{\chi^0,R} \left(U_{c2,1} Z_{3,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{3,1}}{c_W} + Z_{3,2} \right) \right) + \\ & \delta Z_{4,n1}^{\chi^0,R} \left(U_{c2,1} Z_{4,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{4,1}}{c_W} + Z_{4,2} \right) \right) + \\ & \delta \bar{Z}_{c2,1}^{\chi,L} \left(U_{1,1} Z_{n1,3} - \frac{U_{1,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & \delta \bar{Z}_{c2,2}^{\chi,L} \left(U_{2,1} Z_{n1,3} - \frac{U_{2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & 2\delta Z_e \left(U_{c2,1} Z_{n1,3} - \frac{U_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) \end{aligned} \right\} \right. \end{aligned} \right\} \right] \right]$$

$$C(\tilde{\chi}_{c2}^-, \tilde{\chi}_{n1}^0, H^+) =$$

$$\left[-\frac{ie}{4c_W^3 s_W^2} \left\{ \sqrt{2} U_{c2,2}^* \left\{ s_W^2 Z_{n1,1}^* (c_\beta c_W^2 \delta Z_{G-H}^* - s_\beta (2\delta s_W s_W + c_W^2 (\delta \bar{Z}_{H-H} + 2\delta Z_e))) + \right. \right. \right. \\ \left. \left. \left. c_W Z_{n1,2}^* (c_\beta \delta Z_{G-H}^* s_W + s_\beta (2\delta s_W - s_W (\delta \bar{Z}_{H-H} + 2\delta Z_e))) - \right. \right. \right. \\ \left. \left. \left. c_W^2 \left\{ s_\beta s_W \left\{ \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* + c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* + c_W Z_{2,2}^*) + \right. \right. \right. \right. \\ \left. \left. \left. \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* + c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* + c_W Z_{4,2}^*) \right\} \right\} \right\} - \right. \\ \left. c_W^2 \left\{ 2c_W U_{c2,1}^* \left\{ Z_{n1,3}^* (c_\beta \delta Z_{G-H}^* s_W + s_\beta (2\delta s_W - s_W (\delta \bar{Z}_{H-H} + 2\delta Z_e))) - \right. \right. \right. \\ \left. \left. \left. s_\beta s_W (\delta Z_{1,n1}^{\chi^0,L} Z_{1,3}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,3}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,3}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,3}^*) \right\} - \right. \right. \\ \left. \left. s_\beta s_W \left\{ \delta Z_{1,c2}^{\chi,L} (2c_W U_{1,1}^* Z_{n1,3}^* - \sqrt{2} U_{1,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*)) + \right. \right. \right. \\ \left. \left. \left. \delta Z_{2,c2}^{\chi,L} (2c_W U_{2,1}^* Z_{n1,3}^* - \sqrt{2} U_{2,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*)) \right\} \right\} \right\} - \right. \\ \left. \frac{ie}{2s_W^2} \left\{ s_W \left\{ c_\beta \left\{ c_\beta \delta s_W (\sqrt{2} V_{c2,2} Z_{n1,2} + 2V_{c2,1} Z_{n1,4}) - \right. \right. \right. \\ \left. \left. \left. (c_\beta \delta \bar{Z}_{H-H} + \delta Z_{G-H}^* s_\beta) \left(V_{c2,1} Z_{n1,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \right. \right. \right. \\ \left. \left. \left. \left\{ \begin{aligned} &\delta Z_{1,n1}^{\chi^0,R} \left(V_{c2,1} Z_{1,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{1,1}}{c_W} + Z_{1,2} \right) \right) + \\ &\delta Z_{2,n1}^{\chi^0,R} \left(V_{c2,1} Z_{2,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{2,1}}{c_W} + Z_{2,2} \right) \right) + \\ &\delta Z_{3,n1}^{\chi^0,R} \left(V_{c2,1} Z_{3,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{3,1}}{c_W} + Z_{3,2} \right) \right) + \\ &\delta Z_{4,n1}^{\chi^0,R} \left(V_{c2,1} Z_{4,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{4,1}}{c_W} + Z_{4,2} \right) \right) + \\ &\frac{\sqrt{2} \delta s_W s_W^2 V_{c2,2} Z_{n1,1}}{c_W^3} + \\ &\delta Z_{1,c2}^{\chi,R} \left(V_{1,1} Z_{n1,4} + \frac{V_{1,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ &\delta Z_{2,c2}^{\chi,R} \left(V_{2,1} Z_{n1,4} + \frac{V_{2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ &2\delta Z_e \left(V_{c2,1} Z_{n1,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) \end{aligned} \right\} \right\} \right\} \right\} \right]$$

$$C(\tilde{\chi}_{c2}^-, \tilde{\chi}_{n1}^0, G^+) =$$

$$\left[\frac{ie}{4c_W^3 s_W^2} \left\{ \begin{aligned} & \sqrt{2} U_{c2,2}^* \left\{ \begin{aligned} & s_W^2 Z_{n1,1}^* (c_W^2 \delta Z_{G-H-} s_\beta - c_\beta (2\delta s_W s_W + c_W^2 (2\delta Z_e + \delta Z_{G-G-}))) + \\ & c_W Z_{n1,2}^* (\delta Z_{G-H-} s_\beta s_W + c_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{G-G-}))) - \\ & c_\beta s_W \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* + c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* + c_W Z_{2,2}^*) + \\ & \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* + c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* + c_W Z_{4,2}^*) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 \left\{ \begin{aligned} & 2c_W U_{c2,1}^* \left\{ \begin{aligned} & c_\beta s_W (\delta Z_{1,n1}^{\chi^0,L} Z_{1,3}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,3}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,3}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,3}^*) - \\ & Z_{n1,3}^* (\delta Z_{G-H-} s_\beta s_W + c_\beta (2\delta s_W - s_W (2\delta Z_e + \delta Z_{G-G-}))) \end{aligned} \right\} + \\ & c_\beta s_W \left\{ \begin{aligned} & \delta Z_{1,c2}^{\chi,L} (2c_W U_{1,1}^* Z_{n1,3}^* - \sqrt{2} U_{1,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*)) + \\ & \delta Z_{2,c2}^{\chi,L} (2c_W U_{2,1}^* Z_{n1,3}^* - \sqrt{2} U_{2,2}^* (s_W Z_{n1,1}^* + c_W Z_{n1,2}^*)) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \left. \begin{aligned} & \frac{ie}{2s_W^2} \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & s_\beta \left(\delta s_W s_\beta (\sqrt{2} V_{c2,2} Z_{n1,2} + 2V_{c2,1} Z_{n1,4}) - \right. \\ & (c_\beta \delta Z_{G-H-} + \delta Z_{G-G-} s_\beta) \left(V_{c2,1} Z_{n1,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & \left. \begin{aligned} & \delta Z_{1,n1}^{\chi^0,R} \left(V_{c2,1} Z_{1,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{1,1}}{c_W} + Z_{1,2} \right) \right) + \\ & \delta Z_{2,n1}^{\chi^0,R} \left(V_{c2,1} Z_{2,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{2,1}}{c_W} + Z_{2,2} \right) \right) + \\ & \delta Z_{3,n1}^{\chi^0,R} \left(V_{c2,1} Z_{3,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{3,1}}{c_W} + Z_{3,2} \right) \right) + \\ & \delta Z_{4,n1}^{\chi^0,R} \left(V_{c2,1} Z_{4,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{4,1}}{c_W} + Z_{4,2} \right) \right) + \\ & \frac{\sqrt{2} \delta s_W s_W^2 V_{c2,2} Z_{n1,1}}{c_W^3} + \\ & \delta Z_{1,c2}^{\chi,R} \left(V_{1,1} Z_{n1,4} + \frac{V_{1,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & \delta Z_{2,c2}^{\chi,R} \left(V_{2,1} Z_{n1,4} + \frac{V_{2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) + \\ & 2\delta Z_e \left(V_{c2,1} Z_{n1,4} + \frac{V_{c2,2}}{\sqrt{2}} \left(\frac{s_W Z_{n1,1}}{c_W} + Z_{n1,2} \right) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \right] \end{aligned}$$

[FFS] Chargino – Quark – Squark

$$\begin{aligned}
C_{267}(\tilde{\chi}_{c1}^-, \bar{d}_{j2}, \tilde{u}_{j1}^1) = & \left[\frac{ie}{2\sqrt{2}c_\beta^2 M_W^3 s_W^2} \left\{ \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & 2c_\beta \delta \text{CKM}_{j1,j2}^* m_{d_{j2}} M_W^2 s_W U_{c1,2}^* U_{s1,1}^{\tilde{u},j1*} + \\ & c_\beta m_{d_{j2}} M_W^2 s_W U_{s1,1}^{\tilde{u},j1*} \left(\delta Z_{1,c1}^{\chi,L} U_{1,2}^* + \delta Z_{2,c1}^{\chi,L} U_{2,2}^* \right) + \right. \\ & U_{c1,2}^* \left\{ \begin{aligned} & c_\beta m_{d_{j2}} M_W^2 s_W \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) + \\ & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & 2c_\beta \delta m_{j2}^d M_W^2 s_W - \\ & m_{d_{j2}} \left(M_W^2 s_W \left(2\delta c_\beta - c_\beta \left(\delta \bar{Z}_{j2,j2}^{d,R} + 2\delta Z_e \right) \right) + c_\beta \left(2\delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \\ & - \frac{ie}{4M_W^3 s_\beta^2 s_W^2} \left\{ \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & 2\delta \text{CKM}_{j1,j2}^* M_W^2 s_\beta s_W \left(2M_W s_\beta U_{s1,1}^{\tilde{u},j1*} V_{c1,1} - \sqrt{2} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} V_{c1,2} \right) - \\ & 2M_W^3 s_\beta^2 U_{s1,1}^{\tilde{u},j1*} \left(V_{c1,1} \left(2\delta s_W - s_W \left(\delta \bar{Z}_{j2,j2}^{d,L} + 2\delta Z_e \right) \right) - s_W \left(\delta Z_{1,c1}^{\chi,R} V_{1,1} + \delta Z_{2,c1}^{\chi,R} V_{2,1} \right) \right) + \\ & \sqrt{2} U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & m_{u_{j1}} M_W^2 s_\beta s_W \left(\delta Z_{1,c1}^{\chi,R} V_{1,2} + \delta Z_{2,c1}^{\chi,R} V_{2,2} \right) + \\ & V_{c1,2} \left(2\delta m_{j1}^u M_W^2 s_\beta s_W - m_{u_{j1}} \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{j2,j2}^{d,L} + 2\delta Z_e \right) \right) + 2M_W^2 \left(\delta s_W s_\beta + \delta s_\beta s_W \right) \right) \right) \end{aligned} \right\} - \\ & M_W^2 s_\beta s_W \left\{ \begin{aligned} & 2M_W s_\beta V_{c1,1} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) - \\ & \sqrt{2} m_{u_{j1}} V_{c1,2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right] \\ \\
C_{268}(\tilde{\chi}_{c1}^+, \bar{u}_{j1}, \tilde{d}_{j2}^2) = & \left[\frac{ie}{2\sqrt{2}M_W^3 s_\beta^2 s_W^2} \left\{ \text{CKM}_{j1,j2} \left\{ \begin{aligned} & 2\delta \text{CKM}_{j1,j2} m_{u_{j1}} M_W^2 s_\beta s_W U_{s2,1}^{\tilde{d},j2*} V_{c1,2}^* + \\ & m_{u_{j1}} M_W^2 s_\beta s_W U_{s2,1}^{\tilde{d},j2*} \left(\delta \bar{Z}_{c1,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c1,2}^{\chi,R} V_{2,2}^* \right) + \\ & V_{c1,2}^* \left\{ \begin{aligned} & m_{u_{j1}} M_W^2 s_\beta s_W \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) + \\ & U_{s2,1}^{\tilde{d},j2*} \left(2\delta m_{j1}^u M_W^2 s_\beta s_W - m_{u_{j1}} \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{j1,j1}^{u,R} + 2\delta Z_e \right) \right) + 2M_W^2 \left(\delta s_W s_\beta + \delta s_\beta s_W \right) \right) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \\ & - \frac{ie}{4c_\beta^2 M_W^3 s_W^2} \left\{ \text{CKM}_{j1,j2} \left\{ \begin{aligned} & 2c_\beta \delta \text{CKM}_{j1,j2} M_W^2 s_W \left(2c_\beta M_W U_{c1,1} U_{s2,1}^{\tilde{d},j2*} - \sqrt{2} m_{d_{j2}} U_{c1,2} U_{s2,2}^{\tilde{d},j2*} \right) - \\ & 2c_\beta^2 M_W^3 U_{s2,1}^{\tilde{d},j2*} \left(U_{c1,1} \left(2\delta s_W - s_W \left(\delta \bar{Z}_{j1,j1}^{u,L} + 2\delta Z_e \right) \right) - s_W \left(\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,1} \right) \right) + \\ & \sqrt{2} U_{s2,2}^{\tilde{d},j2*} \left\{ \begin{aligned} & c_\beta m_{d_{j2}} M_W^2 s_W \left(\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,2} \right) + \\ & U_{c1,2} \left\{ \begin{aligned} & 2c_\beta \delta m_{j2}^d M_W^2 s_W - \\ & m_{d_{j2}} \left(M_W^2 s_W \left(2\delta c_\beta - c_\beta \left(\delta \bar{Z}_{j1,j1}^{u,L} + 2\delta Z_e \right) \right) + c_\beta \left(2\delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \end{aligned} \right\} - \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & 2c_\beta M_W U_{c1,1} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) - \\ & \sqrt{2} m_{d_{j2}} U_{c1,2} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2*} \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right]
\end{aligned}$$

$$\begin{aligned}
C(d_{j2}, \tilde{\chi}_{cl}^+, \tilde{u}_{j1}^{s1,\dagger}) = & \left[\frac{ie}{4 M_W^3 s_\beta^2 s_W^2} \left\{ \text{CKM}_{j1,j2} \left\{ \begin{aligned} & \sqrt{2} V_{cl,2}^* \left\{ m_{u_{j1}} M_W^2 s_\beta s_W \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1} \right) + \right. \right. \\ & U_{s1,2}^{\tilde{u},j1} \left(2 \delta m_{j1}^u M_W^2 s_\beta s_W - m_{u_{j1}} \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(2 \delta Z_e + \delta Z_{j2,j2}^{d,L} \right) \right) + 2 M_W^2 \left(\delta s_W s_\beta + \delta s_\beta s_W \right) \right) \right) \left. \right\} - \\ & M_W^2 s_\beta s_W \left\{ \begin{aligned} & 2 M_W s_\beta U_{s1,1}^{\tilde{u},j1} \left(\delta \bar{Z}_{cl,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{cl,2}^{\chi,R} V_{2,1}^* \right) - \\ & \sqrt{2} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1} \left(\delta \bar{Z}_{cl,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{cl,2}^{\chi,R} V_{2,2}^* \right) \end{aligned} \right\} + \\ & 2 M_W^3 s_\beta^2 V_{cl,1}^* \left(U_{s1,1}^{\tilde{u},j1} \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_{j2,j2}^{d,L} \right) \right) - s_W \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) \right) \\ & 2 \delta \text{CKM}_{j1,j2} M_W^2 s_\beta s_W \left(2 M_W s_\beta U_{s1,1}^{\tilde{u},j1} V_{cl,1}^* - \sqrt{2} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1} V_{cl,2}^* \right) \end{aligned} \right\} - \left. \right\} - \left. \right] \\
& \left[\frac{ie}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \text{CKM}_{j1,j2} \left\{ \begin{aligned} & c_\beta m_{d_{j2}} M_W^2 s_W U_{cl,2} \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) + \right. \\ & U_{s1,1}^{\tilde{u},j1} \left\{ \begin{aligned} & c_\beta m_{d_{j2}} M_W^2 s_W \left(\delta \bar{Z}_{cl,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{cl,2}^{\chi,L} U_{2,2} \right) + \\ & U_{cl,2} \left(2 c_\beta \delta m_{j2}^d M_W^2 s_W - m_{d_{j2}} \left(M_W^2 s_W \left(2 \delta c_\beta - c_\beta \left(2 \delta Z_e + \delta Z_{j2,j2}^{d,R} \right) \right) + c_\beta \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \left. \right\} + \left. \right] \\
& 2 c_\beta \delta \text{CKM}_{j1,j2} m_{d_{j2}} M_W^2 s_W U_{cl,2} U_{s1,1}^{\tilde{u},j1} \\
C(u_{j1}, \tilde{\chi}_{cl}^-, \tilde{d}_{j2}^{s2,\dagger}) = & \left[\frac{ie}{4 c_\beta^2 M_W^3 s_W^2} \left\{ \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & \sqrt{2} U_{cl,2}^* \left\{ c_\beta m_{d_{j2}} M_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2} \right) + \right. \right. \\ & U_{s2,2}^{\tilde{d},j2} \left(2 c_\beta \delta m_{j2}^d M_W^2 s_W - m_{d_{j2}} \left(M_W^2 s_W \left(2 \delta c_\beta - c_\beta \left(2 \delta Z_e + \delta Z_{j1,j1}^{u,L} \right) \right) + c_\beta \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \right) \left. \right\} - \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & 2 c_\beta M_W U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,cl}^{\chi,L} U_{1,1}^* + \delta Z_{2,cl}^{\chi,L} U_{2,1}^* \right) - \\ & \sqrt{2} m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} \left(\delta Z_{1,cl}^{\chi,L} U_{1,2}^* + \delta Z_{2,cl}^{\chi,L} U_{2,2}^* \right) \end{aligned} \right\} + \\ & 2 c_\beta^2 M_W^3 U_{cl,1}^* \left(U_{s2,1}^{\tilde{d},j2} \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_{j1,j1}^{u,L} \right) \right) - s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) \right) \\ & 2 c_\beta \delta \text{CKM}_{j1,j2}^* M_W^2 s_W \left(2 c_\beta M_W U_{cl,1}^* U_{s2,1}^{\tilde{d},j2} - \sqrt{2} m_{d_{j2}} U_{cl,2}^* U_{s2,2}^{\tilde{d},j2} \right) \end{aligned} \right\} - \left. \right\} - \left. \right] \\
& \left[\frac{ie}{2 \sqrt{2} M_W^3 s_\beta^2 s_W^2} \left\{ \text{CKM}_{j1,j2}^* \left\{ \begin{aligned} & m_{u_{j1}} M_W^2 s_\beta s_W V_{cl,2} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) + \right. \\ & U_{s2,1}^{\tilde{d},j2} \left\{ \begin{aligned} & m_{u_{j1}} M_W^2 s_\beta s_W \left(\delta Z_{1,cl}^{\chi,R} V_{1,2} + \delta Z_{2,cl}^{\chi,R} V_{2,2} \right) + \\ & V_{cl,2} \left(2 \delta m_{j1}^u M_W^2 s_\beta s_W - m_{u_{j1}} \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(2 \delta Z_e + \delta Z_{j1,j1}^{u,R} \right) \right) + 2 M_W^2 \left(\delta s_W s_\beta + \delta s_\beta s_W \right) \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \left. \right\} + \left. \right] \\
& 2 \delta \text{CKM}_{j1,j2}^* m_{u_{j1}} M_W^2 s_\beta s_W U_{s2,1}^{\tilde{d},j2} V_{cl,2}
\end{aligned}$$

[FFS] Gluino – Quark – Squark

$$C_{431}(\tilde{g}, \bar{u}_{j1}, \tilde{u}_{j2}^{s2}) = \left[\begin{aligned} & \frac{i g_s \delta_{j1,j2} e_{\tilde{g}}^* T_{o1,o2}^{g1}}{\sqrt{2}} \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1*} + U_{s2,2}^{\tilde{u},j1*} \left(\delta \bar{Z}_{j1,j1}^{u,R} + \delta Z_{\tilde{g}}^L + 2 \delta Z_{g_s} \right) \right) \\ & - \frac{i g_s \delta_{j1,j2} e_{\tilde{g}} T_{o1,o2}^{g1}}{\sqrt{2}} \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1*} + U_{s2,1}^{\tilde{u},j1*} \left(\delta \bar{Z}_{j1,j1}^{u,L} + \delta Z_{\tilde{g}}^R + 2 \delta Z_{g_s} \right) \right) \end{aligned} \right]$$

$$C_{432}(\tilde{g}, \bar{d}_{j1}, \tilde{d}_{j2}^{s2}) = \left[\begin{aligned} & \frac{i g_s \delta_{j1,j2} e_{\tilde{g}}^* T_{o1,o2}^{g1}}{\sqrt{2}} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} + U_{s2,2}^{\tilde{d},j1*} \left(\delta \bar{Z}_{j1,j1}^{d,R} + \delta Z_{\tilde{g}}^L + 2 \delta Z_{g_s} \right) \right) \\ & - \frac{i g_s \delta_{j1,j2} e_{\tilde{g}} T_{o1,o2}^{g1}}{\sqrt{2}} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} + U_{s2,1}^{\tilde{d},j1*} \left(\delta \bar{Z}_{j1,j1}^{d,L} + \delta Z_{\tilde{g}}^R + 2 \delta Z_{g_s} \right) \right) \end{aligned} \right]$$

$$C_{433}(\tilde{g}, u_{j1}, \tilde{u}_{j2}^{s2,\dagger}) = \left[\begin{aligned} & - \frac{i g_s \delta_{j1,j2} e_{\tilde{g}}^* T_{o2,o1}^{g1}}{\sqrt{2}} \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} + U_{s2,1}^{\tilde{u},j1} \left(\delta Z_{\tilde{g}}^L + 2 \delta Z_{g_s} + \delta Z_{j1,j1}^{u,L} \right) \right) \\ & \frac{i g_s \delta_{j1,j2} e_{\tilde{g}} T_{o2,o1}^{g1}}{\sqrt{2}} \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} + U_{s2,2}^{\tilde{u},j1} \left(\delta Z_{\tilde{g}}^R + 2 \delta Z_{g_s} + \delta Z_{j1,j1}^{u,R} \right) \right) \end{aligned} \right]$$

$$C_{434}(\tilde{g}, d_{j1}, \tilde{d}_{j2}^{s2,\dagger}) = \left[\begin{aligned} & - \frac{i g_s \delta_{j1,j2} e_{\tilde{g}}^* T_{o2,o1}^{g1}}{\sqrt{2}} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} + U_{s2,1}^{\tilde{d},j1} \left(\delta Z_{\tilde{g}}^L + 2 \delta Z_{g_s} + \delta Z_{j1,j1}^{d,L} \right) \right) \\ & \frac{i g_s \delta_{j1,j2} e_{\tilde{g}} T_{o2,o1}^{g1}}{\sqrt{2}} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} + U_{s2,2}^{\tilde{d},j1} \left(\delta Z_{\tilde{g}}^R + 2 \delta Z_{g_s} + \delta Z_{j1,j1}^{d,R} \right) \right) \end{aligned} \right]$$

[FFS] Lepton – Neutralino – Slepton

$$C_{259}(\tilde{\chi}_{n1}^0, \bar{\nu}_{j1}, \tilde{\nu}_{j2}) = \left[\begin{aligned} & 0 \\ & \frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_W^3 s_W^2} \left\{ \begin{aligned} & c_W^3 Z_{n1,2} \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{j1,j1}^{\nu,L} + 2 \delta Z_e + \delta Z_{1,1}^{\tilde{\nu},j2} \right) \right) + \\ & s_W \left\{ \begin{aligned} & c_W^2 \left(\delta \bar{Z}_{j1,j1}^{\nu,L} + \delta Z_{1,1}^{\tilde{\nu},j2} \right) + 2 \left(c_W^2 \delta Z_e + \delta s_W s_W \right) + \\ & \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,R} (s_W Z_{1,1} - c_W Z_{1,2}) + \delta Z_{2,n1}^{\chi^0,R} (s_W Z_{2,1} - c_W Z_{2,2}) + \\ & \delta Z_{3,n1}^{\chi^0,R} (s_W Z_{3,1} - c_W Z_{3,2}) + \delta Z_{4,n1}^{\chi^0,R} (s_W Z_{4,1} - c_W Z_{4,2}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right]$$

$$\begin{aligned}
C(\tilde{\chi}_{n1}^0, \bar{e}_{j1}, \tilde{e}_{j2}^{s2}) = & \left[-\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 c_W^3 M_W^3 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & 2 c_\beta^2 M_W^3 s_W^2 Z_{n1,1}^* \left(U_{s2,2}^{\tilde{e},j1*} \left(2 \delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{j1,j1}^{e,R} + 2 \delta Z_e \right) \right) + c_W^2 \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) \right) + \right. \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & 2 c_\beta M_W s_W U_{s2,2}^{\tilde{e},j1*} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,1}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,1}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,1}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,1}^* \right) + \\ & c_W m_{e1} U_{s2,1}^{\tilde{e},j1*} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,3}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,3}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,3}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,3}^* \right) \end{aligned} \right\} + \\ & c_W Z_{n1,3}^* \left\{ \begin{aligned} & c_\beta m_{e1} M_W^2 s_W \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) + \\ & U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ & m_{e1} \left(M_W^2 s_W \left(2 \delta c_\beta - c_\beta \left(\delta \bar{Z}_{j1,j1}^{e,R} + 2 \delta Z_e \right) \right) + c_\beta \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \right] \\
& - \frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 c_W^3 M_W^3 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & c_\beta^3 M_W^3 U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_W^3 Z_{n1,2} \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{j1,j1}^{e,L} + 2 \delta Z_e \right) \right) - s_W^2 Z_{n1,1} \left(2 \delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{j1,j1}^{e,L} + 2 \delta Z_e \right) \right) - \\ & s_W \left\{ \begin{aligned} & c_W^3 \delta Z_{3,n1}^{\chi^0,R} Z_{3,2} + \\ & c_W^2 \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,R} (s_W Z_{1,1} + c_W Z_{1,2}) + \delta Z_{2,n1}^{\chi^0,R} (s_W Z_{2,1} + c_W Z_{2,2}) + \\ & \delta Z_{3,n1}^{\chi^0,R} s_W Z_{3,1} + \delta Z_{4,n1}^{\chi^0,R} (s_W Z_{4,1} + c_W Z_{4,2}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & c_\beta M_W \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) (s_W Z_{n1,1} + c_W Z_{n1,2}) - \\ & c_W m_{e1} Z_{n1,3} \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) \end{aligned} \right\} + \\ & c_W U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & m_{e1} M_W^2 s_W Z_{n1,3} \left(2 \delta c_\beta - c_\beta \left(\delta \bar{Z}_{j1,j1}^{e,L} + 2 \delta Z_e \right) \right) + \\ & \delta M_W^2 m_{e1} s_W Z_{n1,3} + \\ & c_\beta \left\{ \begin{aligned} & 2 \delta s_W m_{e1} Z_{n1,3} - \\ & M_W^2 \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & m_{e1} \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,3} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,3} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,3} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,3} \right) + \\ & 2 \delta m_{j1}^e Z_{n1,3} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \\
C(\nu_{j1}, \tilde{\chi}_{n1}^0, \tilde{\nu}_{j2}^\dagger) = & \left[\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_W^3 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & s_W^2 Z_{n1,1}^* \left(c_W^2 \left(\delta \bar{Z}_{1,1}^{\nu,j2} + \delta Z_{j1,j1}^{\nu,L} \right) + 2 \left(c_W^2 \delta Z_e + \delta s_W s_W \right) \right) - \\ & c_W Z_{n1,2}^* \left(s_W \left(\delta \bar{Z}_{1,1}^{\nu,j2} + \delta Z_{j1,j1}^{\nu,L} \right) - 2 \left(\delta s_W - \delta Z_e s_W \right) \right) - \\ & s_W \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* - c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* - c_W Z_{2,2}^*) + \\ & \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* - c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* - c_W Z_{4,2}^*) \end{aligned} \right\} \end{aligned} \right\} \right\} \right]
\end{aligned}$$

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[FFS] Neutralino – Quark – Squark

$$C(\tilde{\chi}_{n1}^0, \bar{u}_{j1}, \tilde{u}_{j2}^2) = \left[\begin{aligned} & \frac{i e \delta_{j1,j2}}{6 \sqrt{2} c_W^3 M_W^3 s_\beta^2 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & 4 M_W^3 s_\beta^2 s_W^2 Z_{n1,1}^* \left(U_{s2,2}^{\tilde{u},j1*} \left(2 \delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{j1,j1}^{u,R} + 2 \delta Z_e \right) \right) + c_W^2 \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1*} \right) \right) + \right. \\ & M_W^2 s_\beta s_W \left\{ \begin{aligned} & 4 M_W s_\beta s_W U_{s2,2}^{\tilde{u},j1*} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,1}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,1}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,1}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,1}^* \right) - \\ & 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1*} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,4}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,4}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,4}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,4}^* \right) \end{aligned} \right\} - \\ & 3 c_W Z_{n1,4}^* \left\{ \begin{aligned} & m_{u_{j1}} M_W^2 s_\beta s_W \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1*} \right) + \\ & U_{s2,1}^{\tilde{u},j1*} \left(2 \delta m_{j1}^u M_W^2 s_\beta s_W - m_{u_{j1}} \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{j1,j1}^{u,R} + 2 \delta Z_e \right) \right) + 2 M_W^2 \left(\delta s_W s_\beta + \delta s_\beta s_W \right) \right) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \\ & M_W^3 s_\beta^2 U_{s2,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & c_W^3 Z_{n1,2} \left(6 \delta s_W - s_W \left(3 \delta \bar{Z}_{j1,j1}^{u,L} + 6 \delta Z_e \right) \right) - s_W^2 Z_{n1,1} \left(2 \delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{j1,j1}^{u,L} + 2 \delta Z_e \right) \right) - \\ & 3 c_W^3 \delta Z_{3,n1}^{\chi^0,R} Z_{3,2} + \\ & s_W \left\{ \begin{aligned} & c_W^2 \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,R} \left(s_W Z_{1,1} + 3 c_W Z_{1,2} \right) + \delta Z_{2,n1}^{\chi^0,R} \left(s_W Z_{2,1} + 3 c_W Z_{2,2} \right) + \\ & \delta Z_{3,n1}^{\chi^0,R} s_W Z_{3,1} + \delta Z_{4,n1}^{\chi^0,R} \left(s_W Z_{4,1} + 3 c_W Z_{4,2} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \\ & \frac{i e \delta_{j1,j2}}{6 \sqrt{2} c_W^3 M_W^3 s_\beta^2 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & M_W^2 s_\beta s_W \left\{ \begin{aligned} & M_W s_\beta \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1*} \right) \left(s_W Z_{n1,1} + 3 c_W Z_{n1,2} \right) + \\ & 3 c_W m_{u_{j1}} Z_{n1,4} \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} - \\ & m_{u_{j1}} s_\beta s_W Z_{n1,4} \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{j1,j1}^{u,L} + 2 \delta Z_e \right) \right) + \\ & 3 c_W U_{s2,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & M_W^2 \left\{ \begin{aligned} & 2 \delta s_\beta m_{u_{j1}} s_W Z_{n1,4} + \\ & 2 \delta s_W m_{u_{j1}} Z_{n1,4} - \\ & s_\beta \left\{ \begin{aligned} & m_{u_{j1}} \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,4} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,4} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,4} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,4} \right) + \\ & 2 \delta m_{j1}^u Z_{n1,4} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \right\} \end{aligned} \right] \end{aligned}$$

$$\begin{aligned}
C(\tilde{\chi}_{n1}^0, \bar{d}_{j1}, \tilde{d}_{j2}^2) = & \left[-\frac{i e \delta_{j1,j2}}{6 \sqrt{2} c_\beta^2 c_W^3 M_W^3 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & 2 c_\beta^2 M_W^3 s_W^2 Z_{n1,1}^* \left(U_{s2,2}^{\tilde{d},j1*} \left(2 \delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{j1,j1}^{d,R} + 2 \delta Z_e \right) \right) + c_W^2 \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \right) + \right. \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & 2 c_\beta M_W s_W U_{s2,2}^{\tilde{d},j1*} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,1}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,1}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,1}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,1}^* \right) + \\ & 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1*} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,3}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,3}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,3}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,3}^* \right) \end{aligned} \right\} + \\ & 3 c_W Z_{n1,3}^* \left\{ \begin{aligned} & c_\beta m_{d_1} M_W^2 s_W \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_1} \left(M_W^2 s_W \left(2 \delta c_\beta - c_\beta \left(\delta \bar{Z}_{j1,j1}^{d,R} + 2 \delta Z_e \right) \right) + c_\beta \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} + \\ & c_\beta^2 M_W^3 U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & 3 c_W^3 Z_{n1,2} \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{j1,j1}^{d,L} + 2 \delta Z_e \right) \right) + s_W^2 Z_{n1,1} \left(2 \delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{j1,j1}^{d,L} + 2 \delta Z_e \right) \right) - \\ & s_W \left\{ \begin{aligned} & 3 c_W^3 \delta Z_{3,n1}^{\chi^0,R} Z_{3,2} - \\ & c_W^2 \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,R} (s_W Z_{1,1} - 3 c_W Z_{1,2}) + \delta Z_{2,n1}^{\chi^0,R} (s_W Z_{2,1} - 3 c_W Z_{2,2}) + \\ & \delta Z_{3,n1}^{\chi^0,R} s_W Z_{3,1} + \delta Z_{4,n1}^{\chi^0,R} (s_W Z_{4,1} - 3 c_W Z_{4,2}) \end{aligned} \right\} \end{aligned} \right\} \right\} + \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & c_\beta M_W \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) (s_W Z_{n1,1} - 3 c_W Z_{n1,2}) + \\ & 3 c_W m_{d_1} Z_{n1,3} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} - \\ & 3 c_W U_{s2,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & m_{d_1} M_W^2 s_W Z_{n1,3} \left(2 \delta c_\beta - c_\beta \left(\delta \bar{Z}_{j1,j1}^{d,L} + 2 \delta Z_e \right) \right) + \\ & \delta M_W^2 m_{d_1} s_W Z_{n1,3} + \\ & c_\beta \left\{ \begin{aligned} & 2 \delta s_W m_{d_1} Z_{n1,3} - \\ & M_W^2 \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & m_{d_1} \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,3} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,3} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,3} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,3} \right) + \\ & 2 \delta m_{j1}^d Z_{n1,3} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \right\} \right]
\end{aligned}$$

$$\begin{aligned}
C(u_{j1}, \tilde{\chi}_{n1}^0, \tilde{u}_{j2}^{s2,\dagger}) = & \left[\begin{aligned} & -\frac{ie\delta_{j1,j2}}{6\sqrt{2}c_W^3 M_W^3 s_\beta^2 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & 3c_W \left\{ \begin{aligned} & Z_{n1,4}^* \left\{ \begin{aligned} & m_{u_{j1}} M_W^2 s_\beta s_W \left(\delta\bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta\bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} \right) + \right. \\ & U_{s2,2}^{\tilde{u},j1} \left\{ \begin{aligned} & 2\delta m_{j1}^u M_W^2 s_\beta s_W - \\ & m_{u_{j1}} \left(s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(2\delta Z_e + \delta Z_{j1,j1}^{u,L} \right) \right) + 2M_W^2 (\delta s_W s_\beta + \delta s_\beta s_W) \right) \end{aligned} \right\} \end{aligned} \right\} - \end{aligned} \right\} + \\ & M_W^2 s_\beta s_W \left\{ \begin{aligned} & M_W s_\beta U_{s2,1}^{\tilde{u},j1} \left\{ \begin{aligned} & \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* + 3c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* + 3c_W Z_{2,2}^*) + \\ & \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* + 3c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* + 3c_W Z_{4,2}^*) \end{aligned} \right\} + \\ & 3c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,4}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,4}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,4}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,4}^* \right) \end{aligned} \right\} + \end{aligned} \right\} \\ & M_W^3 s_\beta^2 s_W^2 Z_{n1,1}^* \left(U_{s2,1}^{\tilde{u},j1} \left(2\delta s_W s_W + c_W^2 \left(2\delta Z_e + \delta Z_{j1,j1}^{u,L} \right) \right) + c_W^2 \left(\delta\bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta\bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) \right) \end{aligned} \right\} \\ & \frac{ie\delta_{j1,j2}}{6\sqrt{2}c_W^3 M_W^3 s_\beta^2 s_W^2} \left\{ \begin{aligned} & c_W^2 M_W^2 s_\beta s_W \left\{ \begin{aligned} & \delta\bar{Z}_{1,s2}^{\tilde{u},j2} \left(4M_W s_\beta s_W U_{1,2}^{\tilde{u},j1} Z_{n1,1} - 3c_W m_{u_{j1}} U_{1,1}^{\tilde{u},j1} Z_{n1,4} \right) + \\ & \delta\bar{Z}_{2,s2}^{\tilde{u},j2} \left(4M_W s_\beta s_W U_{2,2}^{\tilde{u},j1} Z_{n1,1} - 3c_W m_{u_{j1}} U_{2,1}^{\tilde{u},j1} Z_{n1,4} \right) \end{aligned} \right\} + \\ & c_W^3 U_{s2,1}^{\tilde{u},j1} \left\{ \begin{aligned} & m_{u_{j1}} s_\beta s_W Z_{n1,4} \left(3\delta M_W^2 - 3M_W^2 \left(2\delta Z_e + \delta Z_{j1,j1}^{u,R} \right) \right) - \\ & M_W^2 \left\{ \begin{aligned} & 3m_{u_{j1}} s_\beta s_W \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,4} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,4} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,4} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,4} \right) + \\ & 6Z_{n1,4} \left(\delta m_{j1}^u s_\beta s_W - m_{u_{j1}} (\delta s_W s_\beta + \delta s_\beta s_W) \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & 4M_W^3 s_\beta^2 s_W^2 U_{s2,2}^{\tilde{u},j1} \left(Z_{n1,1} \left(c_W^2 \delta Z_{j1,j1}^{u,R} + 2\delta s_W s_W \right) + c_W^2 \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,1} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,1} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,1} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,1} + 2\delta Z_e Z_{n1,1} \right) \right) \end{aligned} \right\} \end{aligned} \right]
\end{aligned}$$

$$C(d_{j1}, \tilde{\chi}_{n1}^0, \tilde{d}_{j2}^{s2,\dagger}) = \left[\begin{aligned} & -\frac{i e \delta_{j1,j2}}{6 \sqrt{2} c_\beta^2 c_W^3 M_W^3 s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} & c_W \left\{ \begin{aligned} & 3 Z_{n1,3}^* \left\{ c_\beta m_{d_1} M_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} \right) + \right. \right. \\ & U_{s2,2}^{\tilde{d},j1} \left\{ 2 c_\beta \delta m_{j1}^d M_W^2 s_W - \right. \\ & m_{d_1} \left(M_W^2 s_W \left(2 \delta c_\beta - c_\beta \left(2 \delta Z_e + \delta Z_{j1,j1}^{d,L} \right) \right) + c_\beta \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \end{aligned} \right\} + \end{aligned} \right\} + \end{aligned} \right\} \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & c_\beta M_W U_{s2,1}^{\tilde{d},j1} \left\{ \delta Z_{1,n1}^{\chi^0,L} (s_W Z_{1,1}^* - 3 c_W Z_{1,2}^*) + \delta Z_{2,n1}^{\chi^0,L} (s_W Z_{2,1}^* - 3 c_W Z_{2,2}^*) + \right. \\ & \delta Z_{3,n1}^{\chi^0,L} (s_W Z_{3,1}^* - 3 c_W Z_{3,2}^*) + \delta Z_{4,n1}^{\chi^0,L} (s_W Z_{4,1}^* - 3 c_W Z_{4,2}^*) \end{aligned} \right\} + \end{aligned} \right\} \\ & 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} \left(\delta Z_{1,n1}^{\chi^0,L} Z_{1,3}^* + \delta Z_{2,n1}^{\chi^0,L} Z_{2,3}^* + \delta Z_{3,n1}^{\chi^0,L} Z_{3,3}^* + \delta Z_{4,n1}^{\chi^0,L} Z_{4,3}^* \right) \end{aligned} \right\} + \end{aligned} \right\} \\ & c_\beta^2 M_W^3 s_W^2 Z_{n1,1}^* \left(U_{s2,1}^{\tilde{d},j1} \left(2 \delta s_W s_W + c_W^2 \left(2 \delta Z_e + \delta Z_{j1,j1}^{d,L} \right) \right) + c_W^2 \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) \right) \end{aligned} \right\} \\ & -\frac{i e \delta_{j1,j2}}{6 \sqrt{2} c_\beta^2 c_W^3 M_W^3 s_W^2} \left\{ c_\beta c_W^2 \left\{ \begin{aligned} & M_W^2 s_W \left\{ \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left(2 c_\beta M_W s_W U_{1,2}^{\tilde{d},j1} Z_{n1,1} + 3 c_W m_{d_1} U_{1,1}^{\tilde{d},j1} Z_{n1,3} \right) + \right. \\ & \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left(2 c_\beta M_W s_W U_{2,2}^{\tilde{d},j1} Z_{n1,1} + 3 c_W m_{d_1} U_{2,1}^{\tilde{d},j1} Z_{n1,3} \right) \end{aligned} \right\} + \end{aligned} \right\} - \end{aligned} \right\} \\ & c_W U_{s2,1}^{\tilde{d},j1} \left\{ \begin{aligned} & 3 m_{d_1} M_W^2 s_W \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,3} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,3} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,3} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,3} \right) + \\ & Z_{n1,3} \left(6 \delta m_{j1}^d M_W^2 s_W - 3 m_{d_1} \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \end{aligned} \right\} \end{aligned} \right\} \\ & 3 c_W^3 m_{d_1} M_W^2 s_W U_{s2,1}^{\tilde{d},j1} Z_{n1,3} \left(2 \delta c_\beta - c_\beta \left(2 \delta Z_e + \delta Z_{j1,j1}^{d,R} \right) \right) + \\ & 2 c_\beta^2 M_W^3 s_W^2 U_{s2,2}^{\tilde{d},j1} \left(Z_{n1,1} \left(2 \delta s_W s_W + c_W^2 \left(2 \delta Z_e + \delta Z_{j1,j1}^{d,R} \right) \right) + c_W^2 \left(\delta Z_{1,n1}^{\chi^0,R} Z_{1,1} + \delta Z_{2,n1}^{\chi^0,R} Z_{2,1} + \delta Z_{3,n1}^{\chi^0,R} Z_{3,1} + \delta Z_{4,n1}^{\chi^0,R} Z_{4,1} \right) \right) \end{aligned} \right\} \end{aligned} \right]$$

[FFV] 2 Charginos – Gauge Boson

$$C(\tilde{\chi}_{c2}^+, \tilde{\chi}_{c1}^-, \gamma) = \left[\begin{aligned} & -\frac{i e}{4 c_W s_W} \left\{ \begin{aligned} & 2 s_W \left(\delta_{c1,c2} (\delta Z_{Z\gamma} s_W - c_W (2 \delta Z_e + \delta Z_{\gamma\gamma})) - c_W \left(\delta_{c1,1} \delta \bar{Z}_{c2,1}^{\chi,L} + \delta_{c1,2} \delta \bar{Z}_{c2,2}^{\chi,L} + \delta_{c2,1} \delta Z_{1,c1}^{\chi,L} + \delta_{c2,2} \delta Z_{2,c1}^{\chi,L} \right) \right) - \end{aligned} \right\} \\ & \delta Z_{Z\gamma} \left(2 U_{c1,1}^* U_{c2,1} + U_{c1,2}^* U_{c2,2} \right) \end{aligned} \right\} \\ & -\frac{i e}{4 c_W s_W} \left\{ \begin{aligned} & 2 s_W \left(\delta_{c1,c2} (\delta Z_{Z\gamma} s_W - c_W (2 \delta Z_e + \delta Z_{\gamma\gamma})) - c_W \left(\delta_{c1,1} \delta \bar{Z}_{c2,1}^{\chi,R} + \delta_{c1,2} \delta \bar{Z}_{c2,2}^{\chi,R} + \delta_{c2,1} \delta Z_{1,c1}^{\chi,R} + \delta_{c2,2} \delta Z_{2,c1}^{\chi,R} \right) \right) - \end{aligned} \right\} \\ & \delta Z_{Z\gamma} \left(2 V_{c1,1} V_{c2,1}^* + V_{c1,2} V_{c2,2}^* \right) \end{aligned} \right\} \end{aligned} \right]$$

$$C(\tilde{\chi}_{c2}^+, \tilde{\chi}_{c1}^-, Z) = \begin{bmatrix} \frac{ie}{4c_W^3 s_W^2} \left\{ \begin{aligned} & s_W^2 \left(4\delta s_W U_{c1,1}^* U_{c2,1} + \delta_{c1,c2} (2c_W^3 \delta Z_{\gamma Z} - 4\delta s_W s_W^2 - 2c_W^2 (2\delta s_W + s_W (2\delta Z_e + \delta Z_{ZZ}))) \right) + \\ & U_{c1,2}^* U_{c2,2} (2\delta s_W s_W + c_W^2 (2\delta Z_e + \delta Z_{ZZ})) - \\ & c_W^2 \left\{ \begin{aligned} & \delta Z_{1,c1}^{\chi,L} (2\delta_{c2,1} s_W^2 - 2U_{1,1}^* U_{c2,1} - U_{1,2}^* U_{c2,2}) + \\ & \delta Z_{2,c1}^{\chi,L} (2\delta_{c2,2} s_W^2 - 2U_{2,1}^* U_{c2,1} - U_{2,2}^* U_{c2,2}) \end{aligned} \right\} - \\ & c_W^2 \left\{ \begin{aligned} & 2s_W^3 (\delta_{c1,1} \delta \bar{Z}_{c2,1}^{\chi,L} + \delta_{c1,2} \delta \bar{Z}_{c2,2}^{\chi,L}) + \\ & 2U_{c1,1}^* (U_{c2,1} (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ})) - s_W (\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,1})) + \\ & U_{c1,2}^* (2\delta s_W U_{c2,2} - s_W (\delta \bar{Z}_{c2,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c2,2}^{\chi,L} U_{2,2})) \end{aligned} \right\} \end{aligned} \right\} + \\ \frac{ie}{4c_W^3 s_W^2} \left\{ \begin{aligned} & \delta_{c1,c2} s_W^2 (2c_W^3 \delta Z_{\gamma Z} - 4\delta s_W s_W^2 - 2c_W^2 (2\delta s_W + s_W (2\delta Z_e + \delta Z_{ZZ}))) + \\ & 2s_W V_{c1,1} (2\delta s_W s_W V_{c2,1}^* + c_W^2 (\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,1}^*)) + \\ & V_{c1,2} (V_{c2,2}^* (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ}))) + c_W^2 s_W (\delta \bar{Z}_{c2,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c2,2}^{\chi,R} V_{2,2}^*)) - \\ & c_W^2 \left\{ \begin{aligned} & 2s_W^3 (\delta_{c1,1} \delta \bar{Z}_{c2,1}^{\chi,R} + \delta_{c1,2} \delta \bar{Z}_{c2,2}^{\chi,R}) + 2V_{c1,1} V_{c2,1}^* (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ})) + \\ & s_W \left\{ \begin{aligned} & \delta Z_{1,c1}^{\chi,R} (2\delta_{c2,1} s_W^2 - 2V_{1,1} V_{c2,1}^* - V_{1,2} V_{c2,2}^*) + \\ & \delta Z_{2,c1}^{\chi,R} (2\delta_{c2,2} s_W^2 - 2V_{2,1} V_{c2,1}^* - V_{2,2} V_{c2,2}^*) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{bmatrix}$$

[FFV] 2 Gluinos – Gluon

$$C(\tilde{g}, \tilde{g}, g) = \begin{bmatrix} -\frac{g_s f^{g^1, g^2, g^3}}{2} (\delta Z_{gg} + 2 (\delta Z_{\tilde{g}}^L + \delta Z_{g_s})) \\ -\frac{g_s f^{g^1, g^2, g^3}}{2} (\delta Z_{gg} + 2 (\delta Z_{\tilde{g}}^R + \delta Z_{g_s})) \end{bmatrix}$$

[FFV] 2 Leptons – Gauge Boson

$$C(\bar{e}_{j2}, e_{j1}, \gamma) = \begin{bmatrix} \frac{ie \delta_{j1,j2}}{4} \left(4\delta Z_e + 2\delta Z_{\gamma\gamma} + 2 (\delta \bar{Z}_{j2,j2}^{e,L} + \delta Z_{j2,j2}^{e,L}) + \frac{1}{c_W s_W} (\delta Z_{Z\gamma} - 2\delta Z_{Z\gamma} s_W^2) \right) \\ -\frac{ie \delta_{j1,j2}}{2c_W} (\delta Z_{Z\gamma} s_W - c_W (\delta \bar{Z}_{j2,j2}^{e,R} + 2\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{j2,j2}^{e,R})) \end{bmatrix}$$

$$C_{199}(\bar{\nu}_{j2}, \nu_{j1}, Z) = \begin{bmatrix} -\frac{i e \delta_{j1,j2}}{4 c_W^3 s_W^2} \left(2 \delta s_W s_W^2 - c_W^2 \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{j2,j2}^{\nu,L} + 2 \delta Z_e + \delta Z_{ZZ} + \delta Z_{j2,j2}^{\nu,L} \right) \right) \right) \\ 0 \end{bmatrix}$$

$$C_{200}(\bar{e}_{j2}, e_{j1}, Z) = \begin{bmatrix} -\frac{i e \delta_{j1,j2}}{4 c_W^3 s_W^2} \left(2 s_W^2 (\delta s_W - c_W^3 \delta Z_{\gamma Z}) + c_W^2 \left(2 \delta s_W + s_W (1 - 2 c_W^2) \left(\delta \bar{Z}_{j2,j2}^{e,L} + 2 \delta Z_e + \delta Z_{ZZ} + \delta Z_{j2,j2}^{e,L} \right) \right) \right) \\ -\frac{i e \delta_{j1,j2}}{2 c_W^3} \left(2 \delta s_W - c_W^2 \left(c_W \delta Z_{\gamma Z} - s_W \left(\delta \bar{Z}_{j2,j2}^{e,R} + 2 \delta Z_e + \delta Z_{ZZ} + \delta Z_{j2,j2}^{e,R} \right) \right) \right) \end{bmatrix}$$

$$C_{206}(\bar{e}_{j2}, \nu_{j1}, W^-) = \begin{bmatrix} \frac{i e \delta_{j1,j2}}{2 \sqrt{2} s_W^2} \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{j2,j2}^{e,L} + 2 \delta Z_e + \delta Z_W + \delta Z_{j2,j2}^{\nu,L} \right) \right) \\ 0 \end{bmatrix}$$

$$C_{207}(\bar{\nu}_{j2}, e_{j1}, W^+) = \begin{bmatrix} \frac{i e \delta_{j1,j2}}{2 \sqrt{2} s_W^2} \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{j2,j2}^{\nu,L} + 2 \delta Z_e + \delta Z_W + \delta Z_{j2,j2}^{e,L} \right) \right) \\ 0 \end{bmatrix}$$

$$C_{422}(\bar{\nu}_{j1}, \nu_{j2}, \gamma) = \begin{bmatrix} -\frac{i e \delta_{j1,j2} \delta Z_{Z\gamma}}{4 c_W s_W} \\ 0 \end{bmatrix}$$

[FFV] 2 Neutralinos – Gauge Boson

$$C(\tilde{\chi}_{n1}^0, \tilde{\chi}_{n2}^0, Z) = \left[-\frac{ie}{4c_W^3 s_W^2} \left\{ \begin{aligned} & Z_{n2,3}^* \left\{ \begin{aligned} & 2\delta s_W s_W^2 Z_{n1,3} + \\ & c_W^2 \left\{ \begin{aligned} & s_W \left(\delta \bar{Z}_{n1,1}^{\chi^0,L} Z_{1,3} + \delta \bar{Z}_{n1,2}^{\chi^0,L} Z_{2,3} + \delta \bar{Z}_{n1,3}^{\chi^0,L} Z_{3,3} + \delta \bar{Z}_{n1,4}^{\chi^0,L} Z_{4,3} \right) - \\ & Z_{n1,3} (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ})) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 s_W \left\{ \begin{aligned} & Z_{n1,3} \left(\delta Z_{1,n2}^{\chi^0,L} Z_{1,3}^* + \delta Z_{2,n2}^{\chi^0,L} Z_{2,3}^* + \delta Z_{3,n2}^{\chi^0,L} Z_{3,3}^* + \delta Z_{4,n2}^{\chi^0,L} Z_{4,3}^* \right) - \\ & Z_{n1,4} \left(\delta Z_{1,n2}^{\chi^0,L} Z_{1,4}^* + \delta Z_{2,n2}^{\chi^0,L} Z_{2,4}^* + \delta Z_{3,n2}^{\chi^0,L} Z_{3,4}^* + \delta Z_{4,n2}^{\chi^0,L} Z_{4,4}^* \right) \end{aligned} \right\} - \\ & Z_{n2,4}^* \left\{ \begin{aligned} & 2\delta s_W s_W^2 Z_{n1,4} + \\ & c_W^2 \left\{ \begin{aligned} & s_W \left(\delta \bar{Z}_{n1,1}^{\chi^0,L} Z_{1,4} + \delta \bar{Z}_{n1,2}^{\chi^0,L} Z_{2,4} + \delta \bar{Z}_{n1,3}^{\chi^0,L} Z_{3,4} + \delta \bar{Z}_{n1,4}^{\chi^0,L} Z_{4,4} \right) - \\ & Z_{n1,4} (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ \frac{ie}{4c_W^3 s_W^2} \left\{ \begin{aligned} & Z_{n1,3}^* \left\{ \begin{aligned} & c_W^2 s_W \left(\delta Z_{1,n2}^{\chi^0,R} Z_{1,3} + \delta Z_{2,n2}^{\chi^0,R} Z_{2,3} + \delta Z_{3,n2}^{\chi^0,R} Z_{3,3} + \delta Z_{4,n2}^{\chi^0,R} Z_{4,3} \right) + \\ & Z_{n2,3} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ}))) \end{aligned} \right\} - \\ & Z_{n1,4}^* \left\{ \begin{aligned} & c_W^2 s_W \left(\delta Z_{1,n2}^{\chi^0,R} Z_{1,4} + \delta Z_{2,n2}^{\chi^0,R} Z_{2,4} + \delta Z_{3,n2}^{\chi^0,R} Z_{3,4} + \delta Z_{4,n2}^{\chi^0,R} Z_{4,4} \right) + \\ & Z_{n2,4} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ}))) \end{aligned} \right\} + \\ & c_W^2 s_W \left\{ \begin{aligned} & Z_{n2,3} \left(\delta \bar{Z}_{n1,1}^{\chi^0,R} Z_{1,3}^* + \delta \bar{Z}_{n1,2}^{\chi^0,R} Z_{2,3}^* + \delta \bar{Z}_{n1,3}^{\chi^0,R} Z_{3,3}^* + \delta \bar{Z}_{n1,4}^{\chi^0,R} Z_{4,3}^* \right) - \\ & Z_{n2,4} \left(\delta \bar{Z}_{n1,1}^{\chi^0,R} Z_{1,4}^* + \delta \bar{Z}_{n1,2}^{\chi^0,R} Z_{2,4}^* + \delta \bar{Z}_{n1,3}^{\chi^0,R} Z_{3,4}^* + \delta \bar{Z}_{n1,4}^{\chi^0,R} Z_{4,4}^* \right) \end{aligned} \right\} \end{aligned} \right\} \right] \\ C(\tilde{\chi}_{n1}^0, \tilde{\chi}_{n2}^0, \gamma) = \left[\begin{aligned} & -\frac{ie\delta Z_{Z\gamma}}{4c_W s_W} (Z_{n1,3} Z_{n2,3}^* - Z_{n1,4} Z_{n2,4}^*) \\ & \frac{ie\delta Z_{Z\gamma}}{4c_W s_W} (Z_{n1,3}^* Z_{n2,3} - Z_{n1,4}^* Z_{n2,4}) \end{aligned} \right]$$

[FFV] 2 Quarks – Gauge Boson

$$C(\bar{u}_{j2}, u_{j1}, \gamma) = \left[\begin{aligned} & -\frac{ie}{12c_W s_W} \left(4c_W s_W \left(\delta \bar{Z}_{j1,j2}^{u,L} + \delta Z_{j2,j1}^{u,L} \right) - \delta_{j1,j2} \left(\delta Z_{Z\gamma} (1 - 4c_W^2) - 4c_W s_W (2\delta Z_e + \delta Z_{\gamma\gamma}) \right) \right) \\ & -\frac{ie}{3c_W} \left(c_W \left(\delta \bar{Z}_{j1,j2}^{u,R} + \delta Z_{j2,j1}^{u,R} \right) - \delta_{j1,j2} \left(\delta Z_{Z\gamma} s_W - c_W (2\delta Z_e + \delta Z_{\gamma\gamma}) \right) \right) \end{aligned} \right]$$

$$\begin{aligned}
C(\bar{d}_{j2}, d_{j1}, \gamma) &= \left[\begin{aligned} &\frac{ie}{12 c_W s_W} \left(2 c_W s_W \left(\delta \bar{Z}_{j1,j2}^{d,L} + \delta Z_{j2,j1}^{d,L} \right) + \delta_{j1,j2} \left(\delta Z_{Z\gamma} + 2 \left(c_W^2 \delta Z_{Z\gamma} + c_W s_W \left(2 \delta Z_e + \delta Z_{\gamma\gamma} \right) \right) \right) \right) \\ &\frac{ie}{6 c_W} \left(c_W \left(\delta \bar{Z}_{j1,j2}^{d,R} + \delta Z_{j2,j1}^{d,R} \right) - \delta_{j1,j2} \left(\delta Z_{Z\gamma} s_W - c_W \left(2 \delta Z_e + \delta Z_{\gamma\gamma} \right) \right) \right) \end{aligned} \right] \\
C(\bar{u}_{j2}, u_{j1}, Z) &= \left[\begin{aligned} &\frac{ie}{12 c_W^3 s_W^2} \left(c_W^2 s_W \left(1 - 4 c_W^2 \right) \left(\delta \bar{Z}_{j1,j2}^{u,L} + \delta Z_{j2,j1}^{u,L} \right) + \delta_{j1,j2} \left(2 s_W^2 \left(\delta s_W - 2 c_W^3 \delta Z_{\gamma Z} \right) + c_W^2 \left(6 \delta s_W + s_W \left(1 - 4 c_W^2 \right) \left(2 \delta Z_e + \delta Z_{ZZ} \right) \right) \right) \right) \\ &\frac{ie}{3 c_W^3} \left(c_W^2 s_W \left(\delta \bar{Z}_{j1,j2}^{u,R} + \delta Z_{j2,j1}^{u,R} \right) + \delta_{j1,j2} \left(2 \delta s_W - c_W^2 \left(c_W \delta Z_{\gamma Z} - s_W \left(2 \delta Z_e + \delta Z_{ZZ} \right) \right) \right) \right) \end{aligned} \right] \\
C(\bar{d}_{j2}, d_{j1}, Z) &= \left[\begin{aligned} &\frac{ie}{12 c_W^3 s_W^2} \left(c_W^2 s_W \left(1 + 2 c_W^2 \right) \left(\delta \bar{Z}_{j1,j2}^{d,L} + \delta Z_{j2,j1}^{d,L} \right) + \delta_{j1,j2} \left(2 s_W^2 \left(\delta s_W + c_W^3 \delta Z_{\gamma Z} \right) - c_W^2 \left(6 \delta s_W - s_W \left(1 + 2 c_W^2 \right) \left(2 \delta Z_e + \delta Z_{ZZ} \right) \right) \right) \right) \\ &-\frac{ie}{6 c_W^3} \left(c_W^2 s_W \left(\delta \bar{Z}_{j1,j2}^{d,R} + \delta Z_{j2,j1}^{d,R} \right) + \delta_{j1,j2} \left(2 \delta s_W - c_W^2 \left(c_W \delta Z_{\gamma Z} - s_W \left(2 \delta Z_e + \delta Z_{ZZ} \right) \right) \right) \right) \end{aligned} \right] \\
C(\bar{d}_{j2}, u_{j1}, W^-) &= \left[\begin{aligned} &\frac{ie}{2 \sqrt{2} s_W^2} \left\{ \begin{aligned} &\text{CKM}_{j1,j2}^* \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_W \right) \right) - \\ &s_W \left\{ \begin{aligned} &2 \delta \text{CKM}_{j1,j2}^* + \delta \bar{Z}_{j2,1}^{d,L} \text{CKM}_{j1,1}^* + \delta \bar{Z}_{j2,2}^{d,L} \text{CKM}_{j1,2}^* + \delta \bar{Z}_{j2,3}^{d,L} \text{CKM}_{j1,3}^* + \\ &\delta Z_{1,j1}^{u,L} \text{CKM}_{1,j2}^* + \delta Z_{2,j1}^{u,L} \text{CKM}_{2,j2}^* + \delta Z_{3,j1}^{u,L} \text{CKM}_{3,j2}^* \end{aligned} \right\} \end{aligned} \right\} \\ &0 \end{aligned} \right] \\
C(\bar{u}_{j2}, d_{j1}, W^+) &= \left[\begin{aligned} &\frac{ie}{2 \sqrt{2} s_W^2} \left\{ \begin{aligned} &\text{CKM}_{j2,j1} \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_W \right) \right) - \\ &s_W \left\{ \begin{aligned} &2 \delta \text{CKM}_{j2,j1} + \delta \bar{Z}_{j2,1}^{u,L} \text{CKM}_{1,j1} + \delta \bar{Z}_{j2,2}^{u,L} \text{CKM}_{2,j1} + \delta \bar{Z}_{j2,3}^{u,L} \text{CKM}_{3,j1} + \\ &\delta Z_{1,j1}^{d,L} \text{CKM}_{j2,1} + \delta Z_{2,j1}^{d,L} \text{CKM}_{j2,2} + \delta Z_{3,j1}^{d,L} \text{CKM}_{j2,3} \end{aligned} \right\} \end{aligned} \right\} \\ &0 \end{aligned} \right]
\end{aligned}$$

[FFV] 2 Quarks – Gluon

$$C(\bar{u}_{j1}, u_{j2}, g) = \left[\begin{aligned} &-\frac{ig_s \delta_{j1,j2} T_{o1,o2}^{g1}}{2} \left(\delta \bar{Z}_{j1,j1}^{u,L} + \delta Z_{gg} + 2 \delta Z_{g_s} + \delta Z_{j2,j2}^{u,L} \right) \\ &-\frac{ig_s \delta_{j1,j2} T_{o1,o2}^{g1}}{2} \left(\delta \bar{Z}_{j1,j1}^{u,R} + \delta Z_{gg} + 2 \delta Z_{g_s} + \delta Z_{j2,j2}^{u,R} \right) \end{aligned} \right]$$

$$C(\bar{d}_{j1}, d_{j2}, g) = \begin{bmatrix} -\frac{i g_s \delta_{j1,j2} T_{o1,o2}^{g1}}{2} \left(\delta \bar{Z}_{j1,j1}^{d,L} + \delta Z_{gg} + 2 \delta Z_{g_s} + \delta Z_{j2,j2}^{d,L} \right) \\ -\frac{i g_s \delta_{j1,j2} T_{o1,o2}^{g1}}{2} \left(\delta \bar{Z}_{j1,j1}^{d,R} + \delta Z_{gg} + 2 \delta Z_{g_s} + \delta Z_{j2,j2}^{d,R} \right) \end{bmatrix}$$

[FFV] Chargino – Neutralino – Gauge Boson

$$C(\tilde{\chi}_{n2}^0, \tilde{\chi}_{c1}^+, W^-) = \begin{bmatrix} -\frac{i e}{4 s_W^2} \left\{ \begin{aligned} &2 V_{c1,1}^* \left(Z_{n2,2} (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_W)) - s_W \left(\delta \bar{Z}_{n2,1}^{\chi^0,L} Z_{1,2} + \delta \bar{Z}_{n2,2}^{\chi^0,L} Z_{2,2} + \delta \bar{Z}_{n2,3}^{\chi^0,L} Z_{3,2} + \delta \bar{Z}_{n2,4}^{\chi^0,L} Z_{4,2} \right) \right) - \\ &\sqrt{2} V_{c1,2}^* \left(Z_{n2,4} (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_W)) - s_W \left(\delta \bar{Z}_{n2,1}^{\chi^0,L} Z_{1,4} + \delta \bar{Z}_{n2,2}^{\chi^0,L} Z_{2,4} + \delta \bar{Z}_{n2,3}^{\chi^0,L} Z_{3,4} + \delta \bar{Z}_{n2,4}^{\chi^0,L} Z_{4,4} \right) \right) - \\ &s_W \left(2 Z_{n2,2} \left(\delta \bar{Z}_{c1,1}^{\chi,R} V_{1,1}^* + \delta \bar{Z}_{c1,2}^{\chi,R} V_{2,1}^* \right) - \sqrt{2} Z_{n2,4} \left(\delta \bar{Z}_{c1,1}^{\chi,R} V_{1,2}^* + \delta \bar{Z}_{c1,2}^{\chi,R} V_{2,2}^* \right) \right) \end{aligned} \right\} \\ -\frac{i e}{4 s_W^2} \left\{ \begin{aligned} &2 Z_{n2,2}^* \left(U_{c1,1} (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_W)) - s_W \left(\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,1} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,1} \right) \right) + \\ &\sqrt{2} Z_{n2,3}^* \left(U_{c1,2} (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_W)) - s_W \left(\delta \bar{Z}_{c1,1}^{\chi,L} U_{1,2} + \delta \bar{Z}_{c1,2}^{\chi,L} U_{2,2} \right) \right) - \\ &s_W \left\{ \begin{aligned} &2 U_{c1,1} \left(\delta \bar{Z}_{n2,1}^{\chi^0,R} Z_{1,2}^* + \delta \bar{Z}_{n2,2}^{\chi^0,R} Z_{2,2}^* + \delta \bar{Z}_{n2,3}^{\chi^0,R} Z_{3,2}^* + \delta \bar{Z}_{n2,4}^{\chi^0,R} Z_{4,2}^* \right) + \\ &\sqrt{2} U_{c1,2} \left(\delta \bar{Z}_{n2,1}^{\chi^0,R} Z_{1,3}^* + \delta \bar{Z}_{n2,2}^{\chi^0,R} Z_{2,3}^* + \delta \bar{Z}_{n2,3}^{\chi^0,R} Z_{3,3}^* + \delta \bar{Z}_{n2,4}^{\chi^0,R} Z_{4,3}^* \right) \end{aligned} \right\} \end{aligned} \right\} \end{bmatrix}$$

$$C(\tilde{\chi}_{c1}^-, \tilde{\chi}_{n2}^0, W^+) = \begin{bmatrix} -\frac{i e}{4 s_W^2} \left\{ \begin{aligned} &2 Z_{n2,2}^* \left(V_{c1,1} (2 \delta s_W - s_W (\delta \bar{Z}_W + 2 \delta Z_e)) - s_W \left(\delta Z_{1,c1}^{\chi,R} V_{1,1} + \delta Z_{2,c1}^{\chi,R} V_{2,1} \right) \right) - \\ &\sqrt{2} Z_{n2,4}^* \left(V_{c1,2} (2 \delta s_W - s_W (\delta \bar{Z}_W + 2 \delta Z_e)) - s_W \left(\delta Z_{1,c1}^{\chi,R} V_{1,2} + \delta Z_{2,c1}^{\chi,R} V_{2,2} \right) \right) - \\ &s_W \left\{ \begin{aligned} &2 V_{c1,1} \left(\delta Z_{1,n2}^{\chi^0,L} Z_{1,2}^* + \delta Z_{2,n2}^{\chi^0,L} Z_{2,2}^* + \delta Z_{3,n2}^{\chi^0,L} Z_{3,2}^* + \delta Z_{4,n2}^{\chi^0,L} Z_{4,2}^* \right) - \\ &\sqrt{2} V_{c1,2} \left(\delta Z_{1,n2}^{\chi^0,L} Z_{1,4}^* + \delta Z_{2,n2}^{\chi^0,L} Z_{2,4}^* + \delta Z_{3,n2}^{\chi^0,L} Z_{3,4}^* + \delta Z_{4,n2}^{\chi^0,L} Z_{4,4}^* \right) \end{aligned} \right\} \end{aligned} \right\} \\ -\frac{i e}{4 s_W^2} \left\{ \begin{aligned} &2 U_{c1,1}^* \left(Z_{n2,2} (2 \delta s_W - s_W (\delta \bar{Z}_W + 2 \delta Z_e)) - s_W \left(\delta Z_{1,n2}^{\chi^0,R} Z_{1,2} + \delta Z_{2,n2}^{\chi^0,R} Z_{2,2} + \delta Z_{3,n2}^{\chi^0,R} Z_{3,2} + \delta Z_{4,n2}^{\chi^0,R} Z_{4,2} \right) \right) + \\ &\sqrt{2} U_{c1,2}^* \left(Z_{n2,3} (2 \delta s_W - s_W (\delta \bar{Z}_W + 2 \delta Z_e)) - s_W \left(\delta Z_{1,n2}^{\chi^0,R} Z_{1,3} + \delta Z_{2,n2}^{\chi^0,R} Z_{2,3} + \delta Z_{3,n2}^{\chi^0,R} Z_{3,3} + \delta Z_{4,n2}^{\chi^0,R} Z_{4,3} \right) \right) - \\ &s_W \left(2 Z_{n2,2} \left(\delta Z_{1,c1}^{\chi,L} U_{1,1}^* + \delta Z_{2,c1}^{\chi,L} U_{2,1}^* \right) + \sqrt{2} Z_{n2,3} \left(\delta Z_{1,c1}^{\chi,L} U_{1,2}^* + \delta Z_{2,c1}^{\chi,L} U_{2,2}^* \right) \right) \end{aligned} \right\} \end{bmatrix}$$

[SS] 2 Higgs

$$C_{452}(h^0, h^0) = \begin{bmatrix} -i \delta Z_{hh} \\ -i (\delta m_{hh}^2 + \delta Z_{hh} M_{h^0}^{02}) \end{bmatrix}$$

$$C_{453}(h^0, H^0) = \begin{bmatrix} -i \delta Z_{hH} \\ -\frac{i}{2} (2 \delta m_{hH}^2 + \delta Z_{hH} (M_{h^0}^{02} + M_{H^0}^{02})) \end{bmatrix}$$

$$C_{454}(h^0, A^0) = \begin{bmatrix} -i \delta Z_{hA} \\ -\frac{i}{2} (2 \delta m_{hA}^2 + \delta Z_{hA} (M_{A^0}^{02} + M_{h^0}^{02})) \end{bmatrix}$$

$$C_{455}(h^0, G^0) = \begin{bmatrix} -i \delta Z_{hG} \\ -\frac{i}{2} (2 \delta m_{hG}^2 + \delta Z_{hG} M_{h^0}^{02}) \end{bmatrix}$$

$$C_{456}(H^0, h^0) = \begin{bmatrix} -i \delta Z_{hH} \\ -\frac{i}{2} (2 \delta m_{hH}^2 + \delta Z_{hH} (M_{h^0}^{02} + M_{H^0}^{02})) \end{bmatrix}$$

$$C_{457}(H^0, H^0) = \begin{bmatrix} -i \delta Z_{HH} \\ -i (\delta m_{HH}^2 + \delta Z_{HH} M_{H^0}^{02}) \end{bmatrix}$$

$$C_{458}(H^0, A^0) = \begin{bmatrix} -i \delta Z_{HA} \\ -\frac{i}{2} (2 \delta m_{HA}^2 + \delta Z_{HA} (M_{A^0}^{02} + M_{H^0}^{02})) \end{bmatrix}$$

$$C_{459}(H^0, G^0) = \begin{bmatrix} -i \delta Z_{HG} \\ -\frac{i}{2} (2 \delta m_{HG}^2 + \delta Z_{HG} M_{H^0}^{02}) \end{bmatrix}$$

$$C_{460}(A^0, h^0) = \begin{bmatrix} -i\delta Z_{hA} \\ -\frac{i}{2} (2\delta m_{hA}^2 + \delta Z_{hA} (M_{A^0}^{02} + M_{h^0}^{02})) \end{bmatrix}$$

$$C_{461}(A^0, H^0) = \begin{bmatrix} -i\delta Z_{HA} \\ -\frac{i}{2} (2\delta m_{HA}^2 + \delta Z_{HA} (M_{A^0}^{02} + M_{H^0}^{02})) \end{bmatrix}$$

$$C_{462}(A^0, A^0) = \begin{bmatrix} -i\delta Z_{AA} \\ -i(\delta m_{AA}^2 + \delta Z_{AA} M_{A^0}^{02}) \end{bmatrix}$$

$$C_{463}(A^0, G^0) = \begin{bmatrix} -i\delta Z_{AG} \\ -\frac{i}{2} (2\delta m_{AG}^2 + \delta Z_{AG} M_{A^0}^{02}) \end{bmatrix}$$

$$C_{464}(G^0, h^0) = \begin{bmatrix} -i\delta Z_{hG} \\ -\frac{i}{2} (2\delta m_{hG}^2 + \delta Z_{hG} M_{h^0}^{02}) \end{bmatrix}$$

$$C_{465}(G^0, H^0) = \begin{bmatrix} -i\delta Z_{HG} \\ -\frac{i}{2} (2\delta m_{HG}^2 + \delta Z_{HG} M_{H^0}^{02}) \end{bmatrix}$$

$$C_{466}(G^0, A^0) = \begin{bmatrix} -i\delta Z_{AG} \\ -\frac{i}{2} (2\delta m_{AG}^2 + \delta Z_{AG} M_{A^0}^{02}) \end{bmatrix}$$

$$C_{467}(G^0, G^0) = \begin{bmatrix} -i\delta Z_{GG} \\ -i\delta m_{GG}^2 \end{bmatrix}$$

$$C_{468}(H^-, H^+) = \begin{bmatrix} -\frac{i}{2} (\delta \bar{Z}_{H^-H^-} + \delta Z_{H^-H^-}) \\ -\frac{i}{2} (2\delta m_{H^-H^-}^2 + M_{H^-}^{02} (\delta \bar{Z}_{H^-H^-} + \delta Z_{H^-H^-})) \end{bmatrix}$$

$$C_{469}(H^-, G^+) = \begin{bmatrix} -i \delta Z_{G^- H^-} \\ -\frac{i}{2} (2 \delta m_{G^- H^-}^2 + \delta Z_{H^- G^-} M_{H^-}^{02}) \end{bmatrix}$$

$$C_{470}(G^-, H^+) = \begin{bmatrix} -\frac{i}{2} (\delta Z_{G^- H^-}^* + \delta Z_{H^- G^-}) \\ -\frac{i}{2} (2 \delta m_{H^- G^-}^2 + \delta Z_{G^- H^-} M_{H^-}^{02}) \end{bmatrix}$$

$$C_{471}(G^-, G^+) = \begin{bmatrix} -i \delta Z_{G^- G^-} \\ -i \delta m_{G^- G^-}^2 \end{bmatrix}$$

[SS] 2 Sleptons

$$C_{450}(\tilde{\nu}_{j1}^\dagger, \tilde{\nu}_{j2}) = \begin{bmatrix} -\frac{i \delta_{j1,j2}}{2} (\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{1,1}^{\tilde{\nu},j1}) \\ -\frac{i \delta_{j1,j2}}{2} (2 \delta m_{1,1}^{\tilde{\nu},j1} + m_{\tilde{\nu}_{j1}}^2 (\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{1,1}^{\tilde{\nu},j1})) \end{bmatrix}$$

$$C_{451}(\tilde{e}_{j1}^{s1,\dagger}, \tilde{e}_{j2}^{s2}) = \begin{bmatrix} -\frac{i \delta_{j1,j2}}{2} (\delta \bar{Z}_{s2,s1}^{\tilde{e},j2} + \delta Z_{s1,s2}^{\tilde{e},j1}) \\ -\frac{i \delta_{j1,j2}}{2} (2 \delta m_{s1,s2}^{\tilde{e},j1} + \delta Z_{s1,s2}^{\tilde{e},j1} m_{\tilde{e}_{j1}^{s1}}^2 + \delta \bar{Z}_{s2,s1}^{\tilde{e},j2} m_{\tilde{e}_{j2}^{s2}}^2) \end{bmatrix}$$

[SS] 2 Squarks

$$C_{472}(\tilde{u}_{j1}^{s1,\dagger}, \tilde{u}_{j2}^{s2}) = \begin{bmatrix} -\frac{i \delta_{j1,j2}}{2} (\delta \bar{Z}_{s2,s1}^{\tilde{u},j2} + \delta Z_{s1,s2}^{\tilde{u},j1}) \\ -\frac{i \delta_{j1,j2}}{2} (2 \delta m_{s1,s2}^{\tilde{u},j1} + \delta Z_{s1,s2}^{\tilde{u},j1} m_{\tilde{u}_{j1}^{s1}}^2 + \delta \bar{Z}_{s2,s1}^{\tilde{u},j2} m_{\tilde{u}_{j2}^{s2}}^2) \end{bmatrix}$$

$$C(d_{473}^{\tilde{s}1,\dagger}, d_{\tilde{j}2}^{\tilde{s}2}) = \left[\begin{array}{c} -\frac{i\delta_{j1,j2}}{2} \left(\delta\bar{Z}_{s2,s1}^{\tilde{d},j2} + \delta Z_{s1,s2}^{\tilde{d},j1} \right) \\ -\frac{i\delta_{j1,j2}}{2} \left(2\delta m_{s1,s2}^{\tilde{d},j1} + \delta Z_{s1,s2}^{\tilde{d},j1} m_{\tilde{d}1}^2 + \delta\bar{Z}_{s2,s1}^{\tilde{d},j2} m_{\tilde{d}2}^2 \right) \end{array} \right]$$

[SSS] 3 Higgs

$$C(h^0, h^0, h^0) = -\frac{3ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\alpha} \left(4\delta s_W M_W^2 s_{\alpha+\beta} s_W^2 - c_W^2 \left(2\delta s_W M_W^2 s_{\alpha+\beta} - s_W \left(\delta M_W^2 s_{\alpha+\beta} + M_W^2 \left(2c_{\alpha+\beta} c_\beta^2 \delta t_\beta + s_{\alpha+\beta} (2\delta Z_e + 3\delta Z_{hh}) \right) \right) \right) \right) - \right. \\ \left. c_W^2 \delta Z_{hH} M_W^2 s_W (c_{2\alpha} c_{\alpha+\beta} - 2s_{2\alpha} s_{\alpha+\beta}) \right\}$$

$$C(h^0, h^0, H^0) = -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ \begin{array}{l} 2s_{2\alpha} \left\{ \begin{array}{l} 4\delta s_W M_W^2 s_{\alpha+\beta} s_W^2 - \\ c_W^2 \left\{ \begin{array}{l} 2\delta s_W M_W^2 s_{\alpha+\beta} - \\ s_W \left(\delta M_W^2 s_{\alpha+\beta} + M_W^2 \left(2c_{\alpha+\beta} (c_\beta^2 \delta t_\beta - \delta Z_{hH}) + s_{\alpha+\beta} (\delta Z_{HH} + 2(\delta Z_e + \delta Z_{hh})) \right) \right) \right\} \end{array} \right\} \\ c_{2\alpha} \left\{ \begin{array}{l} c_W^2 M_W^2 s_{\alpha+\beta} s_W (2c_\beta^2 \delta t_\beta + \delta Z_{hH}) - \\ c_{\alpha+\beta} (4\delta s_W M_W^2 s_W^2 - c_W^2 (2\delta s_W M_W^2 - s_W (\delta M_W^2 + M_W^2 (\delta Z_{HH} + 2(\delta Z_e + \delta Z_{hh})))) \end{array} \right\} \end{array} \right\} + \end{array} \right\}$$

$$C(h^0, H^0, H^0) = \frac{ie}{4c_W^4 M_W s_W^2} \left\{ \begin{array}{l} c_{\alpha+\beta} \left\{ \begin{array}{l} 8\delta s_W M_W^2 s_{2\alpha} s_W^2 - \\ c_W^2 \left\{ \begin{array}{l} 4\delta s_W M_W^2 s_{2\alpha} - \\ s_W \left\{ \begin{array}{l} 2\delta M_W^2 s_{2\alpha} + \\ M_W^2 (c_{2\alpha} (2c_\beta^2 \delta t_\beta - \delta Z_{hH}) + s_{2\alpha} (4\delta Z_e + 2\delta Z_{hh} + 4\delta Z_{HH})) \end{array} \right\} \end{array} \right\} \end{array} \right\} \\ s_{\alpha+\beta} \left\{ \begin{array}{l} 4c_W^2 M_W^2 s_{2\alpha} s_W (c_\beta^2 \delta t_\beta + \delta Z_{hH}) - \\ c_{2\alpha} (4\delta s_W M_W^2 s_W^2 + c_W^2 (\delta M_W^2 s_W - M_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{hh} + 2\delta Z_{HH})))) \end{array} \right\} \end{array} \right\} - \end{array} \right\}$$

$$C(H^0, H^0, H^0) = \frac{3ie}{4c_W^4 M_W s_W^2} \left\{ \begin{array}{l} 2c_{\alpha+\beta} c_W^2 \delta Z_{hH} M_W^2 s_{2\alpha} s_W + \\ c_{2\alpha} \left\{ \begin{array}{l} c_W^2 M_W^2 s_{\alpha+\beta} s_W (2c_\beta^2 \delta t_\beta + \delta Z_{hH}) - \\ c_{\alpha+\beta} (4\delta s_W M_W^2 s_W^2 + c_W^2 (\delta M_W^2 s_W - M_W^2 (2\delta s_W - s_W (2\delta Z_e + 3\delta Z_{HH})))) \end{array} \right\} \end{array} \right\}$$

$$\begin{aligned}
C(h^0, A^0, A^0) &= -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\beta} \left\{ \begin{aligned} &2c_W^2 \delta Z_{AG} M_W^2 s_{2\beta} s_{\alpha+\beta} s_W + \\ &4\delta s_W M_W^2 s_{\alpha+\beta} s_W^2 - \\ &c_W^2 \left\{ \begin{aligned} &2\delta s_W M_W^2 s_{\alpha+\beta} - \\ &s_W \left\{ \begin{aligned} &\delta M_W^2 s_{\alpha+\beta} + \\ &M_W^2 \left(c_{\alpha+\beta} \left(2c_\beta^2 \delta t_\beta - \delta Z_{hH} \right) + s_{\alpha+\beta} (2\delta Z_e + 2\delta Z_{AA} + \delta Z_{hh}) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \\
C(h^0, G^0, G^0) &= -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\beta} \left\{ \begin{aligned} &2c_W^2 \delta Z_{AG} M_W^2 s_{2\beta} s_{\alpha+\beta} s_W - \\ &4\delta s_W M_W^2 s_{\alpha+\beta} s_W^2 - \\ &c_W^2 \left\{ \begin{aligned} &2\delta s_W M_W^2 s_{\alpha+\beta} - \\ &s_W \left\{ \begin{aligned} &\delta M_W^2 s_{\alpha+\beta} + \\ &M_W^2 \left(c_{\alpha+\beta} \left(2c_\beta^2 \delta t_\beta - \delta Z_{hH} \right) + s_{\alpha+\beta} (2\delta Z_e + 2\delta Z_{GG} + \delta Z_{hh}) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \\
C(h^0, A^0, G^0) &= -\frac{ie s_{2\beta}}{4c_W^4 M_W s_W^2} \left\{ c_W^2 \left\{ \begin{aligned} &4\delta s_W M_W^2 s_{\alpha+\beta} s_W^2 - \\ &2\delta s_W M_W^2 s_{\alpha+\beta} - \\ &s_W \left(\delta M_W^2 s_{\alpha+\beta} + M_W^2 \left(c_{\alpha+\beta} \left(2c_\beta^2 \delta t_\beta - \delta Z_{hH} \right) + s_{\alpha+\beta} (2\delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{hh}) \right) \right) \end{aligned} \right\} \right\} \\
C(H^0, A^0, A^0) &= \frac{ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\beta} \left\{ \begin{aligned} &2c_{\alpha+\beta} c_W^2 \delta Z_{AG} M_W^2 s_{2\beta} s_W - \\ &c_W^2 M_W^2 s_{\alpha+\beta} s_W \left(2c_\beta^2 \delta t_\beta + \delta Z_{hH} \right) - \\ &c_{\alpha+\beta} \left(4\delta s_W M_W^2 s_W^2 - c_W^2 \left(2\delta s_W M_W^2 - s_W \left(\delta M_W^2 + M_W^2 (2\delta Z_e + 2\delta Z_{AA} + \delta Z_{HH}) \right) \right) \right) \end{aligned} \right\} \right\} \\
C(H^0, G^0, G^0) &= \frac{ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\beta} \left\{ \begin{aligned} &2c_{\alpha+\beta} c_W^2 \delta Z_{AG} M_W^2 s_{2\beta} s_W + \\ &c_W^2 M_W^2 s_{\alpha+\beta} s_W \left(2c_\beta^2 \delta t_\beta + \delta Z_{hH} \right) - \\ &c_{\alpha+\beta} \left(4\delta s_W M_W^2 s_W^2 - c_W^2 \left(2\delta s_W M_W^2 - s_W \left(\delta M_W^2 + M_W^2 (2\delta Z_e + 2\delta Z_{GG} + \delta Z_{HH}) \right) \right) \right) \end{aligned} \right\} \right\} \\
C(H^0, A^0, G^0) &= -\frac{ie s_{2\beta}}{4c_W^4 M_W s_W^2} \left\{ c_{\alpha+\beta} \left(4\delta s_W M_W^2 s_W^2 - c_W^2 \left(2\delta s_W M_W^2 - s_W \left(\delta M_W^2 + M_W^2 (2\delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{HH}) \right) \right) \right) \right\}
\end{aligned}$$

$$C(h^0, H^-, H^+) = -\frac{ie}{4c_W^2 M_W s_W^2} \left\{ s_W \left\{ M_W^2 \left\{ \begin{aligned} & \delta s_W M_W^2 \left(\frac{4c_{2\beta} s_{\alpha+\beta} s_W^2}{c_W^2} - 2s_\beta (c_{2\beta} c_\alpha + c_W^2 (2c_\alpha - s_{2\beta} s_\alpha)) + s_\alpha (2c_\beta - 4c_\beta^3 s_W^2) \right) + \\ & \left(\delta M_W^2 + 2\delta Z_e M_W^2 \right) (c_\alpha s_\beta (c_{2\beta} + 2c_W^2) - s_\alpha (c_\beta + c_W^2 s_{2\beta} s_\beta - 2c_\beta^3 s_W^2)) - \\ & \left(\begin{aligned} & \delta c_\beta s_\alpha (2 - 4c_\beta^2 s_W^2) - c_\alpha \delta s_\beta (2 - 4s_\beta^2 s_W^2) - \\ & s_\beta (c_{2\beta} + 2c_W^2) (\delta Z_{hH} s_\alpha + c_\alpha (\delta \bar{Z}_{H-H^-} + \delta Z_{hh} + \delta Z_{H-H^-})) - \\ & (c_\beta - 2c_\beta^3 s_W^2) (c_\alpha \delta Z_{hH} - s_\alpha (\delta \bar{Z}_{H-H^-} + \delta Z_{hh} + \delta Z_{H-H^-})) - \\ & 2 \text{Re}(\delta Z_{G-H^-}) s_{2\beta} s_{\alpha+\beta} s_W^2 + \\ & c_W^2 \left\{ \begin{aligned} & c_{2\beta} c_{\alpha+\beta} (\delta Z_{G-H^-} + \delta Z_{G-H^-}^*) - \\ & s_{2\beta} \left\{ \begin{aligned} & 2(c_\alpha \delta c_\beta - \delta s_\beta s_\alpha) + \\ & s_\beta (c_\alpha \delta Z_{hH} - s_\alpha (\delta \bar{Z}_{H-H^-} + \delta Z_{hh} + \delta Z_{H-H^-})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \right\} \right\} \end{aligned} \right.$$

$$C(h^0, G^-, G^+) = -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\beta} \left\{ \begin{aligned} & c_W^2 M_W^2 s_W (c_\alpha \delta s_\beta (2 - 4c_\beta^2 s_W^2) - \delta c_\beta s_\alpha (2 - 4s_\beta^2 s_W^2) - s_{2\beta} (2c_W^2 (c_\alpha \delta c_\beta - \delta s_\beta s_\alpha) - s_{\alpha+\beta} s_W^2 (\delta Z_{G-H^-} + \delta Z_{H-G^-}))) - \\ & M_W^2 (4\delta s_W s_{\alpha+\beta} s_W^2 + c_{\alpha+\beta} c_W^4 s_W (\delta Z_{G-H^-} + \delta Z_{H-G^-})) - \\ & c_W^2 \left\{ \begin{aligned} & 2\delta s_W M_W^2 s_{\alpha+\beta} - \\ & s_W (\delta M_W^2 s_{\alpha+\beta} - M_W^2 (c_{\alpha+\beta} \delta Z_{hH} - s_{\alpha+\beta} (2\delta Z_e + \delta Z_{hh} + 2\delta Z_{G-G^-}))) \end{aligned} \right\} \end{aligned} \right\} \right\}$$

$$C(h^0, H^-, G^+) = -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ c_{2\beta} c_W^4 \left\{ \begin{aligned} & M_W^2 s_{\alpha+\beta} s_W (2c_\beta^2 \delta t_\beta - \delta Z_{hH}) + \\ & c_{\alpha+\beta} (2\delta s_W M_W^2 - s_W (\delta M_W^2 + M_W^2 (2\delta Z_e + \delta Z_{hh} + \delta Z_{G-G^-} + \delta Z_{H-H^-}))) \end{aligned} \right\} + \right. \\ \left. s_W \left\{ c_W^2 s_{2\beta} s_W \left\{ \begin{aligned} & 2\delta s_W M_W^2 s_{\alpha+\beta} + \\ & s_W \left\{ \begin{aligned} & \delta M_W^2 s_{\alpha+\beta} + \\ & M_W^2 \left\{ \begin{aligned} & c_{\alpha+\beta} (2c_\beta^2 \delta t_\beta - \delta Z_{hH}) + \\ & s_{\alpha+\beta} (2\delta Z_e + \delta Z_{hh} + \delta Z_{G-G^-} + \delta Z_{H-H^-}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \right\} \right\}$$

$$C(h^0, G^-, H^+) = -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ \begin{array}{l} \frac{s_W}{2} \left\{ \begin{array}{l} 2s_{2\beta} s_W \left(4\delta s_W M_W^2 s_{\alpha+\beta} s_W^2 + c_W^2 \left(2\delta s_W M_W^2 s_{\alpha+\beta} + s_W \left(\delta M_W^2 s_{\alpha+\beta} + 2M_W^2 \left(c_{\alpha+\beta} c_\beta^2 \delta t_\beta + \delta Z_e s_{\alpha+\beta} \right) \right) \right) - \right. \\ c_W^2 M_W^2 \left\{ \begin{array}{l} 2c_{2\beta} \delta Z_{G^-H^-} s_{\alpha+\beta} - 2\delta Z_{H^-G^-} (1-2c_W^2) (c_\beta^3 s_\alpha - c_\alpha s_\beta^3) - \\ s_{2\beta} \left\{ \begin{array}{l} \delta Z_{H^-G^-} (c_{\alpha+\beta} + 2c_{\alpha+\beta} c_W^2) - \\ s_W^2 (2c_{\alpha+\beta} \delta Z_{hH} - 2s_{\alpha+\beta} (\delta \bar{Z}_{H^-H^-} + \delta Z_{hh} + \delta Z_{G^-G^-})) \end{array} \right\} \end{array} \right\} \\ c_{2\beta} c_W^4 \left\{ \begin{array}{l} M_W^2 s_{\alpha+\beta} s_W (2c_\beta^2 \delta t_\beta - \delta Z_{hH}) + \\ c_{\alpha+\beta} (2\delta s_W M_W^2 - s_W (\delta M_W^2 + M_W^2 (\delta \bar{Z}_{H^-H^-} + 2\delta Z_e + \delta Z_{hh} + \delta Z_{G^-G^-}))) \end{array} \right\} \end{array} \right\} + \end{array} \right\}$$

$$C(H^0, H^-, H^+) = \frac{ie}{4c_W^2 M_W s_W^2} \left\{ \begin{array}{l} M_W^2 \left\{ \begin{array}{l} 4s_W^3 (c_\alpha c_\beta^2 \delta c_\beta + \delta s_\beta s_\alpha s_\beta^2) - 2s_W (c_\alpha (\delta c_\beta + c_W^2 \delta s_\beta s_{2\beta}) + s_\alpha (\delta s_\beta + c_W^2 \delta c_\beta s_{2\beta})) + \\ \delta s_W \left(\frac{4c_{2\beta} c_{\alpha+\beta} s_W^2}{c_W^2} + 2(s_\alpha s_\beta (c_{2\beta} + 2c_W^2) + c_\alpha (c_\beta + c_W^2 s_{2\beta} s_\beta - 2c_\beta^3 s_W^2)) \right) \end{array} \right\} - \\ s_W \left\{ \begin{array}{l} (\delta M_W^2 + 2\delta Z_e M_W^2) (s_\alpha s_\beta (c_{2\beta} + 2c_W^2) + c_\alpha (c_\beta + c_W^2 s_{2\beta} s_\beta - 2c_\beta^3 s_W^2)) - \\ M_W^2 \left\{ \begin{array}{l} (\delta Z_{hH} s_\alpha - c_\alpha (\delta \bar{Z}_{H^-H^-} + \delta Z_{HH} + \delta Z_{H^-H^-})) (c_\beta + c_W^2 s_{2\beta} s_\beta - 2c_\beta^3 s_W^2) - \\ s_\beta (c_{2\beta} + 2c_W^2) (c_\alpha \delta Z_{hH} + s_\alpha (\delta \bar{Z}_{H^-H^-} + \delta Z_{HH} + \delta Z_{H^-H^-})) + \\ 2Re(\delta Z_{G^-H^-}) (c_{2\beta} c_W^2 s_{\alpha+\beta} + c_{\alpha+\beta} s_{2\beta} s_W^2) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C(H^0, G^-, G^+) = -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ \begin{array}{l} c_W^2 M_W^2 s_W (\delta s_\beta s_\alpha (2-4c_\beta^2 s_W^2) + c_\alpha \delta c_\beta (2-4s_\beta^2 s_W^2) - s_{2\beta} (2c_W^2 (c_\alpha \delta s_\beta + \delta c_\beta s_\alpha) + c_{\alpha+\beta} s_W^2 (\delta Z_{G^-H^-} + \delta Z_{H^-G^-}))) + \\ c_{2\beta} \left\{ \begin{array}{l} M_W^2 (4c_{\alpha+\beta} \delta s_W s_W^2 - c_W^4 s_{\alpha+\beta} s_W (\delta Z_{G^-H^-} + \delta Z_{H^-G^-})) - \\ c_W^2 \left\{ \begin{array}{l} \delta Z_{hH} M_W^2 s_{\alpha+\beta} s_W + \\ c_\alpha c_\beta (2\delta s_W M_W^2 - s_W (\delta M_W^2 + M_W^2 (2\delta Z_e + \delta Z_{HH} + 2\delta Z_{G^-G^-}))) + \\ s_\alpha s_\beta (\delta M_W^2 s_W - M_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{HH} + 2\delta Z_{G^-G^-}))) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C(H^0, H^-, G^+) = -\frac{ie}{4c_W^4 M_W s_W^2} \left\{ \begin{array}{l} c_{2\beta} c_W^4 \left\{ \begin{array}{l} 2\delta s_W M_W^2 s_{\alpha+\beta} - \\ s_W (\delta M_W^2 s_{\alpha+\beta} + M_W^2 (c_{\alpha+\beta} (2c_\beta^2 \delta t_\beta + \delta Z_{hH}) + s_{\alpha+\beta} (2\delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-} + \delta Z_{H^-H^-}))) \end{array} \right\} - \\ s_W \left\{ \begin{array}{l} c_{\alpha+\beta} s_{2\beta} s_W (4\delta s_W M_W^2 s_W^2 + c_W^2 (\delta M_W^2 s_W + M_W^2 (2\delta s_W + s_W (2\delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-} + \delta Z_{H^-H^-})))) - \\ c_W^2 M_W^2 \left\{ \begin{array}{l} s_{2\beta} s_{\alpha+\beta} s_W^2 (2c_\beta^2 \delta t_\beta + \delta Z_{hH}) + \\ c_W^2 \delta Z_{G^-H^-} (s_{2\beta} (2c_\beta s_\alpha - s_{\alpha+\beta}) + 2(s_\alpha s_\beta^3 + c_\alpha (c_\beta^3 + s_{2\beta} s_\beta))) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C_{60}(H^0, G^-, H^+) = -\frac{1e}{8c_W^4 M_W s_W^2}$$

$$C(A^0, H^-, G^+) = -\frac{e}{4 M_W s_W^2} \left(s_W (\delta M_W^2 + M_W^2 (\delta Z_{G^-G^-} + 2 (c_\beta \delta c_\beta + \delta s_\beta s_\beta))) - M_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{AA} + \delta Z_{H^-H^-})) \right)$$

$$C(A^0, G^-, H^+) = \frac{e}{4 M_W s_W^2} \left(s_W \left(\delta M_W^2 + M_W^2 \left(\delta \bar{Z}_{H-H} + 2 (c_\beta \delta c_\beta + \delta s_\beta s_\beta) \right) \right) - M_W^2 \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_{AA} + \delta Z_{G-G} \right) \right) \right)$$

$$C(G^0, H^-, G^+) = \frac{e M_W}{4 s_W} (2 c_\beta \delta s_\beta - \delta Z_{AG} - 2 \delta c_\beta s_\beta)$$

$$C(G^0, G^-, H^+) = -\frac{e M_W}{4 s_W} (2 c_\beta \delta s_\beta - \delta Z_{AG} - 2 \delta c_\beta s_\beta)$$

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$$C(A^0, \tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}) = -\frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ M_W^2 \left\{ s_W \left\{ c_\beta \left\{ m_{e_{j1}} \left\{ U_{s2,1}^{\tilde{e},j1} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) - \right\} + \right. \right. \right. \\ \left. \left. \left. U_{s2,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) \right\} + \right. \right. \\ \left. \left. 2 \delta m_{j1}^e \left(U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) - U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) \right) \right\} + \right. \\ \left. m_{e_{j1}} \left\{ c_\beta \left\{ U_{s1,2}^{\tilde{e},j1*} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \right\} + \right. \right. \\ \left. \left. U_{s1,1}^{\tilde{e},j1*} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) \right\} + \right. \\ \left. U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(2 c_\beta^2 \delta \mu + \delta A_{j1,j1}^{e*} s_{2\beta} \right) - \right. \\ \left. U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(2 c_\beta^2 \delta \mu^* + \delta A_{j1,j1}^e s_{2\beta} \right) \right\} - \\ \left. 2 c_\beta \delta s_W m_{e_{j1}} \left(U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) - U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) \right) \right\} - \\ m_{e_{j1}} s_W \left\{ \begin{aligned} & (c_\beta \delta M_W^2 + M_W^2 (2 \delta c_\beta - c_\beta (2 \delta Z_e + \delta Z_{AA}))) \left(U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) - U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) \right) - \\ & c_\beta \delta Z_{AG} M_W^2 \left(U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) - U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) \right) \end{aligned} \right\} \right\}$$

$$C(G^0_{215}, \tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}) = \frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ M_W^2 \left\{ s_W \left\{ m_{e_{j1}} \left\{ c_\beta \left\{ \begin{aligned} & U_{s1,2}^{\tilde{e},j1*} \left\{ \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \right\} + \right. \\ & \delta Z_{1,s1}^{\tilde{e},j1} \left\{ \begin{aligned} & U_{1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) - \\ & U_{1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) \end{aligned} \right\} + \\ & \delta Z_{2,s1}^{\tilde{e},j1} \left\{ \begin{aligned} & U_{2,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) - \\ & U_{2,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) \end{aligned} \right\} - \\ & \delta Z_{AG} \left\{ \begin{aligned} & U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) - \\ & U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) \end{aligned} \right\} - \\ & U_{s1,1}^{\tilde{e},j1*} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) \\ & 2 c_\beta^2 \delta A_{j1,j1}^{e*} U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} - U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(2 c_\beta^2 \delta A_{j1,j1}^e - \delta \mu^* s_{2\beta} \right) \\ & 2 c_\beta \delta m_{j1}^e \left(U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) - U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) \right) \\ & 2 c_\beta \delta s_W m_{e_{j1}} \left(U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) - U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) \right) \end{aligned} \right\} + \left\{ - \right\} + \left\{ + \right\} + \left\{ + \right\} \right\} \right\} \\ m_{e_{j1}} s_W \left(c_\beta \delta M_W^2 + M_W^2 (2 \delta c_\beta - c_\beta (2 \delta Z_e + \delta Z_{GG})) \right) \left(U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\beta - \mu^* s_\beta \right) - U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\beta - \mu s_\beta \right) \right) \right\} \end{aligned}$$

$$C(h^0_{220}, \tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger) = -\frac{i e \delta_{j1,j2}}{4 c_W^3 M_Z s_W^2} \left\{ \begin{aligned} & c_W^2 \left(2 \delta s_W M_Z^2 s_{\alpha+\beta} - s_W \left(\delta M_Z^2 s_{\alpha+\beta} + 2 M_Z^2 \left(c_{\alpha+\beta} c_\beta^2 \delta t_\beta + \delta Z_e s_{\alpha+\beta} \right) \right) \right) - \\ & M_Z^2 \left(2 \delta s_W s_{\alpha+\beta} s_W^2 - c_W^2 s_W \left(c_{\alpha+\beta} \delta Z_{hH} - s_{\alpha+\beta} \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{hh} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \right) \end{aligned} \right\}$$

$$C(H^0_{221}, \tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger) = -\frac{i e \delta_{j1,j2}}{4 c_W^3 M_Z s_W^2} \left\{ \begin{aligned} & c_{\alpha+\beta} c_W^2 \left(\delta M_Z^2 s_W - 2 M_Z^2 (\delta s_W - \delta Z_e s_W) \right) + \\ & M_Z^2 s_W \left(2 c_{\alpha+\beta} \delta s_W s_W - c_W^2 \left(s_{\alpha+\beta} \left(2 c_\beta^2 \delta t_\beta + \delta Z_{hH} \right) - c_{\alpha+\beta} \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{HH} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \right) \end{aligned} \right\}$$

$$C_{222}(h^0, \tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2, \dagger}) = \frac{i e \delta_{j1, j2}}{4}$$

$$\begin{aligned}
& \left\{ \frac{1}{c_\beta M_W} \right\} \left\{ \frac{1}{s_W} \right\} \left\{ \frac{1}{c_W} \right\} \left\{ \delta \bar{Z}_{1,s2}^{\tilde{e},j2} \left\{ U_{s1,2}^{\tilde{e},j1*} \left\{ c_W m_{e_{j1}} U_{1,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) + \right. \right. \right. \\
& \quad \left. \left. \left. U_{1,2}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{s1,1}^{\tilde{e},j1*} \left\{ U_{1,1}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha + c_\beta M_W M_Z s_{\alpha+\beta} (1 - 2 c_W^2) \right) + \right. \right. \right. \\
& \quad \left. \left. \left. c_W m_{e_{j1}} U_{1,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{s1,2}^{\tilde{e},j1*} \left\{ c_W m_{e_{j1}} U_{2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) + \right. \right. \right. \\
& \quad \left. \left. \left. U_{2,2}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{s1,1}^{\tilde{e},j1*} \left\{ U_{2,1}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha + c_\beta M_W M_Z s_{\alpha+\beta} (1 - 2 c_W^2) \right) + \right. \right. \right. \\
& \quad \left. \left. \left. c_W m_{e_{j1}} U_{2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right\} \right\} + \right. \\
& \quad \left. 2 m_{e_{j1}} \left(U_{s1,2}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \delta \mu + \delta A_{j1,j1}^{e*} s_\alpha \right) + U_{s1,1}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \delta \mu^* + \delta A_{j1,j1}^e s_\alpha \right) \right) \right\} + \\
& \quad \left\{ \frac{2 \delta s_W}{c_W s_W^2} \left\{ U_{s1,1}^{\tilde{e},j1*} \left(c_W m_{e_{j1}} U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) + U_{s2,1}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (3 - 2 c_W^2) \right) \right) + \right. \right. \\
& \quad \left. \left. U_{s1,2}^{\tilde{e},j1*} \left(c_W m_{e_{j1}} U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) + 2 U_{s2,2}^{\tilde{e},j1} \left(c_W m_{e_{j1}}^2 s_\alpha + c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 \right) \right) \right\} \right\} \right\} + \\
& \left\{ \frac{1}{c_\beta M_W} \right\} \left\{ \frac{1}{c_W} \right\} \left\{ 2 \delta m_{j1}^e \left\{ U_{s1,1}^{\tilde{e},j1*} \left(4 m_{e_{j1}} s_\alpha U_{s2,1}^{\tilde{e},j1} + U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right) + \right. \right. \\
& \quad \left. \left. U_{s1,2}^{\tilde{e},j1*} \left(4 m_{e_{j1}} s_\alpha U_{s2,2}^{\tilde{e},j1} + U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) \right) \right\} - \right. \\
& \quad \left. \delta Z_{hH} \left\{ U_{s1,2}^{\tilde{e},j1*} \left\{ c_W m_{e_{j1}} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha \right) + \right. \right. \right. \\
& \quad \left. \left. \left. 2 U_{s2,2}^{\tilde{e},j1} \left(c_\alpha c_W m_{e_{j1}}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2 \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{s1,1}^{\tilde{e},j1*} \left\{ U_{s2,1}^{\tilde{e},j1} \left(2 c_\alpha c_W m_{e_{j1}}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2) \right) + \right. \right. \right. \\
& \quad \left. \left. \left. c_W m_{e_{j1}} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e c_\alpha - \mu^* s_\alpha \right) \right\} \right\} - \right. \\
& \quad \delta Z_{1,s1}^{\tilde{e},j1} \left\{ U_{1,2}^{\tilde{e},j1*} \left\{ c_W m_{e_{j1}} U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) + \right. \right. \right. \\
& \quad \left. \left. \left. U_{s2,2}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{s1,1}^{\tilde{e},j1*} \left\{ U_{s2,1}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha + c_\beta M_W M_Z s_{\alpha+\beta} (1 - 2 c_W^2) \right) + \right. \right. \right. \\
& \quad \left. \left. \left. c_W m_{e_{j1}} U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right\} \right\} - \right. \\
& \quad \delta Z_{2,s1}^{\tilde{e},j1} \left\{ U_{2,2}^{\tilde{e},j1*} \left\{ c_W m_{e_{j1}} U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) + \right. \right. \right. \\
& \quad \left. \left. \left. U_{s2,2}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{2,1}^{\tilde{e},j1*} \left\{ U_{s2,1}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha + c_\beta M_W M_Z s_{\alpha+\beta} (1 - 2 c_W^2) \right) + \right. \right. \right. \\
& \quad \left. \left. \left. c_W m_{e_{j1}} U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right\} \right\} - \right. \\
& \quad \left. (2 \delta Z_e + \delta Z_{hh}) \left\{ U_{s1,2}^{\tilde{e},j1*} \left\{ c_W m_{e_{j1}} U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) + \right. \right. \right. \\
& \quad \left. \left. \left. U_{s2,2}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 \right) \right\} + \right. \right. \\
& \quad \left. \left. U_{s1,1}^{\tilde{e},j1*} \left\{ U_{s2,1}^{\tilde{e},j1} \left(2 c_W m_{e_{j1}}^2 s_\alpha + c_\beta M_W M_Z s_{\alpha+\beta} (1 - 2 c_W^2) \right) + \right. \right. \right. \\
& \quad \left. \left. \left. c_W m_{e_{j1}} U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right\} \right\} \right\} \right\} - \\
& \quad \left\{ U_{s1,1}^{\tilde{e},j1*} \left(2 m_{e_{j1}} s_\alpha U_{s2,1}^{\tilde{e},j1} + U_{s2,2}^{\tilde{e},j1} \left(c_\alpha \mu^* + A_{j1,j1}^e s_\alpha \right) \right) + \right. \\
& \quad \left. U_{s1,2}^{\tilde{e},j1*} \left(2 m_{e_{j1}} s_\alpha U_{s2,2}^{\tilde{e},j1} + U_{s2,1}^{\tilde{e},j1} \left(c_\alpha \mu + A_{j1,j1}^{e*} s_\alpha \right) \right) \right\} \right\} -
\end{aligned}$$

$$C(H^0, \tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2, \dagger}) = \frac{i e \delta_{j1, j2}}{4 s_W^2}$$

$$\left\{ \begin{array}{l} \frac{1}{c_\beta c_W M_W} \left\{ \begin{array}{l} U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W \left\{ \begin{array}{l} m_{e1} U_{s2,1}^{\tilde{e},j1} \left(A_{j1,j1}^{e*} (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) - \mu (2 \delta s_W s_\alpha - c_\alpha \delta Z_{hH} s_W) \right) + \\ 2 m_{e1}^2 U_{s2,2}^{\tilde{e},j1} (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) \end{array} \right\} + \\ 2 c_\beta M_W M_Z s_W^2 U_{s2,2}^{\tilde{e},j1} (2 c_{\alpha+\beta} \delta s_W - \delta Z_{hH} s_{\alpha+\beta} s_W) \end{array} \right\} + \\ U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_\beta M_W M_Z (\delta Z_{hH} s_{\alpha+\beta} s_W (1 - 2 c_W^2) - 2 c_{\alpha+\beta} \delta s_W (3 - 2 c_W^2)) + \\ 2 c_W m_{e1}^2 (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) \end{array} \right\} + \\ c_W m_{e1} U_{s2,2}^{\tilde{e},j1} \left(A_{j1,j1}^e (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) - \mu^* (2 \delta s_W s_\alpha - c_\alpha \delta Z_{hH} s_W) \right) \end{array} \right\} - \\ \frac{1}{c_W} \left\{ \begin{array}{l} U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{array}{l} \delta \bar{Z}_{1,s2}^{\tilde{e},j1} \left\{ \begin{array}{l} U_{1,1}^{\tilde{e},j1} (2 c_\alpha c_W m_{e1}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2)) + \\ c_W m_{e1} U_{1,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha) \end{array} \right\} + \\ \delta \bar{Z}_{2,s2}^{\tilde{e},j1} \left\{ \begin{array}{l} U_{2,1}^{\tilde{e},j1} (2 c_\alpha c_W m_{e1}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2)) + \\ c_W m_{e1} U_{2,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha) \end{array} \right\} + \\ 2 c_W m_{e1} U_{s2,2}^{\tilde{e},j1} (c_\alpha \delta A_{j1,j1}^e - \delta \mu^* s_\alpha) \end{array} \right\} - \\ U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} \delta \bar{Z}_{1,s2}^{\tilde{e},j1} \left\{ \begin{array}{l} 2 c_{\alpha+\beta} c_\beta M_W M_Z s_W^2 U_{1,2}^{\tilde{e},j1} - \\ c_W (2 c_\alpha m_{e1}^2 U_{1,2}^{\tilde{e},j1} + m_{e1} U_{1,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha)) \end{array} \right\} + \\ \delta \bar{Z}_{2,s2}^{\tilde{e},j1} \left\{ \begin{array}{l} 2 c_{\alpha+\beta} c_\beta M_W M_Z s_W^2 U_{2,2}^{\tilde{e},j1} - \\ c_W (2 c_\alpha m_{e1}^2 U_{2,2}^{\tilde{e},j1} + m_{e1} U_{2,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha)) \end{array} \right\} - \\ 2 c_W m_{e1} U_{s2,1}^{\tilde{e},j1} (c_\alpha \delta A_{j1,j1}^{e*} - \delta \mu s_\alpha) \end{array} \right\} \end{array} \right\} - \\ \frac{c_{\alpha+\beta} \delta M_Z^2}{M_Z} (2 s_W^2 U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} - U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} (1 - 2 c_W^2)) \\ 2 \delta m_{j1}^e \left\{ \begin{array}{l} U_{s1,1}^{\tilde{e},j1*} (4 c_\alpha m_{e1} U_{s2,1}^{\tilde{e},j1} + U_{s2,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha)) + \\ U_{s1,2}^{\tilde{e},j1*} (4 c_\alpha m_{e1} U_{s2,2}^{\tilde{e},j1} + U_{s2,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha)) \end{array} \right\} + \\ \frac{1}{c_\beta M_W} \left\{ \begin{array}{l} \delta Z_{1,s1}^{\tilde{e},j1} \left\{ \begin{array}{l} U_{1,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W m_{e1} U_{s2,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha) + \\ 2 U_{s2,2}^{\tilde{e},j1} (c_\alpha c_W m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{array} \right\} + \\ U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e},j1} (2 c_\alpha c_W m_{e1}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2)) + \\ c_W m_{e1} U_{s2,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha) \end{array} \right\} \end{array} \right\} + \\ U_{2,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W m_{e1} U_{s2,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha) + \\ 2 U_{s2,2}^{\tilde{e},j1} (c_\alpha c_W m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{array} \right\} + \\ U_{2,s1}^{\tilde{e},j1} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e},j1} (2 c_\alpha c_W m_{e1}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2)) + \\ c_W m_{e1} U_{s2,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha) \end{array} \right\} \end{array} \right\} + \\ \frac{1}{c_W} \left\{ \begin{array}{l} U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W m_{e1} U_{s2,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha) + \\ 2 U_{s2,2}^{\tilde{e},j1} (c_\alpha c_W m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{array} \right\} + \\ U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e},j1} (2 c_\alpha c_W m_{e1}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2)) + \\ c_W m_{e1} U_{s2,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha) \end{array} \right\} \end{array} \right\} - \\ (2 \delta Z_e + \delta Z_{HH}) \left\{ \begin{array}{l} U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W m_{e1} U_{s2,1}^{\tilde{e},j1} (A_{j1,j1}^{e*} c_\alpha - \mu s_\alpha) + \\ 2 U_{s2,2}^{\tilde{e},j1} (c_\alpha c_W m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{array} \right\} + \\ U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e},j1} (2 c_\alpha c_W m_{e1}^2 + c_{\alpha+\beta} c_\beta M_W M_Z (1 - 2 c_W^2)) + \\ c_W m_{e1} U_{s2,2}^{\tilde{e},j1} (A_{j1,j1}^e c_\alpha - \mu^* s_\alpha) \end{array} \right\} \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$\begin{aligned}
C(H^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = & \frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j1}^e M_W^2 s_W \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) + \\ & c_\beta \left\{ \begin{aligned} & c_\beta \left(2 \delta \mu M_W^2 s_W - \mu \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) + \\ & M_W^2 s_W \left\{ \begin{aligned} & 2 \delta A_{j1,j1}^{e*} s_\beta - \\ & \mu \left(2 \delta c_\beta - \delta Z_{G-H}^* s_\beta - c_\beta \left(\delta \bar{Z}_{H-H} + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 2 \delta Z_e \right) \right) \end{aligned} \right\} \end{aligned} \right\} - \\ & A_{j1,j1}^{e*} \left\{ \begin{aligned} & c_\beta^2 \delta Z_{G-H}^* M_W^2 s_W + \\ & s_\beta \left(2 \delta c_\beta M_W^2 s_W + c_\beta \left(2 \delta s_W M_W^2 + s_W \left(\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{H-H} + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 2 \delta Z_e \right) \right) \right) \right) \end{aligned} \right\} \end{aligned} \right\} \right\} + \\ & c_\beta M_W^2 s_W \left\{ \begin{aligned} & m_{e1} \left(c_\beta \mu + A_{j1,j1}^{e*} s_\beta \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) - \\ & \left(c_\beta M_W^2 s_{2\beta} - m_{e1}^2 s_\beta \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) \end{aligned} \right\} - \\ & U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & 2 c_\beta^3 \left(\delta M_W^2 M_W^2 s_\beta s_W - M_W^4 \left(2 \delta s_W s_\beta - \delta s_\beta s_W \right) \right) + \\ & M_W^2 s_{2\beta} \left(\delta s_W m_{e1}^2 - s_W \left(2 \delta m_{j1}^e m_{e1} - c_\beta M_W^2 \left(\delta c_\beta + c_\beta \left(\delta \bar{Z}_{H-H} + 2 \delta Z_e \right) \right) \right) \right) - \\ & s_W \left\{ \begin{aligned} & m_{e1}^2 \left(\delta Z_e M_W^2 s_{2\beta} - s_\beta \left(c_\beta \delta M_W^2 - M_W^2 \left(c_\beta \delta \bar{Z}_{H-H} - 2 \delta c_\beta \right) \right) \right) - \\ & c_\beta M_W^2 \left(c_\beta \delta Z_{G-H}^* \left(m_{e1}^2 - c_{2\beta} M_W^2 \right) + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} \left(c_\beta M_W^2 s_{2\beta} - m_{e1}^2 s_\beta \right) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \\ \\ & s_W \left\{ \begin{aligned} & M_W^2 \left\{ \begin{aligned} & c_\beta \left\{ \begin{aligned} & \delta \bar{Z}_{1,s2}^{\tilde{e},j2} \left(m_{e1} U_{1,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) - U_{1,1}^{\tilde{e},j1} \left(c_\beta M_W^2 s_{2\beta} - m_{e1}^2 s_\beta \right) \right) + \\ & \delta \bar{Z}_{2,s2}^{\tilde{e},j2} \left(m_{e1} U_{2,2}^{\tilde{e},j1} \left(c_\beta \mu^* + A_{j1,j1}^e s_\beta \right) - U_{2,1}^{\tilde{e},j1} \left(c_\beta M_W^2 s_{2\beta} - m_{e1}^2 s_\beta \right) \right) \end{aligned} \right\} + \\ & \delta m_{j1}^e U_{s2,2}^{\tilde{e},j1} \left(2 c_\beta^2 \mu^* + A_{j1,j1}^e s_{2\beta} \right) \end{aligned} \right\} + \\ & \frac{m_{e1}^2 U_{s2,1}^{\tilde{e},j1}}{2} \left(s_{2\beta} \left(\delta M_W^2 - \delta Z_{1,1}^{\tilde{\nu},j1} M_W^2 \right) + M_W^2 \left(2 c_\beta^2 \delta Z_{G-H} + 4 \delta c_\beta s_\beta - s_{2\beta} \left(2 \delta Z_e + \delta Z_{H-H} \right) \right) \right) \end{aligned} \right\} - \\ & U_{s2,1}^{\tilde{e},j1} \left\{ \begin{aligned} & 2 c_\beta^3 \left(\delta M_W^2 M_W^2 s_\beta s_W - M_W^4 \left(2 \delta s_W s_\beta - \delta s_\beta s_W \right) \right) - \\ & \frac{M_W^4 s_W}{4} \left(\delta Z_{G-H} \left(4 c_\beta^4 - s_{2\beta}^2 \right) - 4 s_{2\beta} \left(c_\beta \delta c_\beta + c_\beta^2 \left(2 \delta Z_e + \delta Z_{H-H} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \right) + \\ & m_{e1} M_W^2 s_{2\beta} \left(\delta s_W m_{e1} - 2 \delta m_{j1}^e s_W \right) \end{aligned} \right\} - \\ & m_{e1} U_{s2,2}^{\tilde{e},j1} \left\{ \begin{aligned} & A_{j1,j1}^e \left(s_\beta s_W \left(c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2 \right) + M_W^2 s_{2\beta} \left(\delta s_W - \delta Z_e s_W \right) \right) + \\ & c_\beta^2 \left(\delta M_W^2 \mu^* s_W + M_W^2 \left(2 \delta s_W \mu^* - 2 \delta \mu^* s_W \right) \right) - \\ & \frac{M_W^2 s_W}{2} \left\{ \begin{aligned} & 2 \delta A_{j1,j1}^e s_{2\beta} - A_{j1,j1}^e \left(2 c_\beta^2 \delta Z_{G-H} - s_{2\beta} \left(\delta Z_{H-H} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) - \\ & \mu^* \left(4 c_\beta \delta c_\beta - \delta Z_{G-H} s_{2\beta} - 2 c_\beta^2 \left(2 \delta Z_e + \delta Z_{H-H} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}$$

$$\begin{aligned}
C(G^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = & -\frac{i e \delta_{j1,j2}}{2 \sqrt{2} c_\beta^2 M_W^3 s_W^2} \left\{ \begin{aligned} & U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & \delta m_{j1}^e M_W^2 s_W \left(2 A_{j1,j1}^{e*} c_\beta^2 - \mu s_{2\beta} \right) + \\ & M_W^2 s_{2\beta} (\delta s_W \mu - s_W (\delta \mu + \delta Z_e \mu)) + \\ & s_W \left\{ \begin{aligned} & \mu s_\beta (c_\beta \delta M_W^2 + 2 \delta c_\beta M_W^2) + \\ & \frac{M_W^2}{2} \left(c_\beta^2 (4 \delta A_{j1,j1}^{e*} - 2 \delta Z_{G^-H^-} \mu) - \mu s_{2\beta} (\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + \delta Z_{G^-G^-}) \right) \end{aligned} \right\} + \\ & A_{j1,j1}^{e*} c_\beta \left\{ \begin{aligned} & M_W^2 s_W (c_\beta \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} - 2 \delta c_\beta - \delta Z_{G^-H^-} s_\beta) - \\ & c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{G^-G^-}))) \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\} + \\ & c_\beta \left\{ \begin{aligned} & M_W^2 s_W \left\{ \begin{aligned} & m_{e_{j1}} (A_{j1,j1}^{e*} c_\beta - \mu s_\beta) (\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*}) + \\ & c_\beta (m_{e_{j1}}^2 - c_{2\beta} M_W^2) (\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*}) \end{aligned} \right\} + \\ & \delta s_W M_W^4 (2 c_\beta^3 - s_{2\beta} s_\beta) - c_\beta m_{e_{j1}}^2 (2 \delta s_W M_W^2 + \delta M_W^2 s_W) - \\ & m_{e_{j1}}^2 (2 \delta c_\beta + \delta Z_{G^-H^-} s_\beta - c_\beta (2 \delta Z_e + \delta Z_{G^-G^-})) - \\ & c_\beta \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} (m_{e_{j1}}^2 - c_{2\beta} M_W^2) - \\ & M_W^2 s_W \left\{ \begin{aligned} & 8 c_\beta \delta m_{j1}^e m_{e_{j1}} - (2 c_\beta^3 - s_{2\beta} s_\beta) (\delta M_W^2 + 2 \delta Z_e M_W^2) - \\ & \frac{1}{2} \left\{ \begin{aligned} & 4 c_\beta^2 \delta c_\beta - \\ & 2 (\delta s_\beta s_{2\beta} - c_\beta (c_{2\beta} \delta Z_{G^-G^-} - \delta Z_{G^-H^-} s_{2\beta})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}$$

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[SSS] Higgs – 2 Squarks

$$C(A^0, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2, \dagger}) = -\frac{e \delta_{j1,2}}{4 M_W^3 s_\beta^2 s_W^2} \left\{ M_W^2 \left\{ s_W \left\{ s_\beta \left\{ m_{u_{j1}} \left\{ \begin{aligned} &\delta Z_{1,s1}^{\tilde{u},j1} \left\{ U_{1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) - \right. \right. \\ &\quad \left. U_{1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) \right. \right\} + \\ &\delta Z_{2,s1}^{\tilde{u},j1} \left\{ U_{2,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) - \right. \\ &\quad \left. U_{2,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) \right. \right\} - \\ &\delta Z_{AG} \left\{ U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(c_\beta \mu - A_{j1,j1}^{u*} s_\beta \right) - \right. \\ &\quad \left. U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \right\} \end{aligned} \right\} - \left\{ \begin{aligned} &2 \delta m_{j1}^u \left(U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) - U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{aligned} \right\} + \right\} + \left\{ \begin{aligned} &s_\beta \left\{ \begin{aligned} &U_{s1,2}^{\tilde{u},j1*} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) - \\ &U_{s1,1}^{\tilde{u},j1*} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} \right) \end{aligned} \right\} + \\ &U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(\delta A_{j1,j1}^{u*} s_{2\beta} + 2 \delta \mu s_\beta^2 \right) - \\ &U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(\delta A_{j1,j1}^u s_{2\beta} + 2 \delta \mu^* s_\beta^2 \right) \end{aligned} \right\} \right\} + \left\{ \begin{aligned} &2 m_{u_{j1}} \left(\delta s_W s_\beta + \delta s_\beta s_W \right) \left(U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) - U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{aligned} \right\} + \left\{ \begin{aligned} &m_{u_{j1}} s_\beta s_W \left(\delta M_W^2 - M_W^2 \left(2 \delta Z_e + \delta Z_{AA} \right) \right) \left(U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) - U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{aligned} \right\} \right\} \right\} \right\}$$

$$C(G^0, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}) = \frac{e \delta_{j1,j2}}{4 M_W^3 s_\beta^2 s_W^2} \left\{ M_W^2 \left\{ \begin{array}{l} s_W \left\{ \begin{array}{l} s_\beta \left\{ \begin{array}{l} m_{u_{j1}} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{u},j1} \left(c_\beta \mu - A_{j1,j1}^{u*} s_\beta \right) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) - \\ U_{s2,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \end{array} \right\} + \\ 2 \delta m_{j1}^u \left(U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(c_\beta \mu - A_{j1,j1}^{u*} s_\beta \right) - U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \right) \end{array} \right\} + \\ m_{u_{j1}} \left\{ \begin{array}{l} s_\beta \left\{ \begin{array}{l} U_{s1,2}^{\tilde{u},j1*} \left(c_\beta \mu - A_{j1,j1}^{u*} s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) - \\ U_{s1,1}^{\tilde{u},j1*} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} \right) \end{array} \right\} + \\ U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(\delta \mu s_{2\beta} - 2 \delta A_{j1,j1}^{u*} s_\beta^2 \right) - \\ U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(\delta \mu^* s_{2\beta} - 2 \delta A_{j1,j1}^u s_\beta^2 \right) \end{array} \right\} \end{array} \right\} - \end{array} \right\} - \\ m_{u_{j1}} s_\beta s_W \left\{ \begin{array}{l} (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{GG})) \left(U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(c_\beta \mu - A_{j1,j1}^{u*} s_\beta \right) - U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \right) - \\ \delta Z_{AG} M_W^2 \left(U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) - U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{array} \right\} \right\}$$

$$C(A^0, \tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = -\frac{e \delta_{j1,j2}}{4 c_\beta^2 M_W^3 s_W^2} \left\{ M_W^2 \left\{ \begin{array}{l} s_W \left\{ \begin{array}{l} c_\beta \left\{ \begin{array}{l} m_{d_{j1}} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j1} \left(c_\beta \mu + A_{j1,j1}^{d*} s_\beta \right) \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) - \\ U_{s2,2}^{\tilde{d},j1} \left(c_\beta \mu^* + A_{j1,j1}^d s_\beta \right) \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) \end{array} \right\} + \\ 2 \delta m_{j1}^d \left(U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \left(c_\beta \mu + A_{j1,j1}^{d*} s_\beta \right) - U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \left(c_\beta \mu^* + A_{j1,j1}^d s_\beta \right) \right) \end{array} \right\} + \\ m_{d_{j1}} \left\{ \begin{array}{l} c_\beta \left\{ \begin{array}{l} U_{s1,2}^{\tilde{d},j1*} \left(c_\beta \mu + A_{j1,j1}^{d*} s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) - \\ U_{s1,1}^{\tilde{d},j1*} \left(c_\beta \mu^* + A_{j1,j1}^d s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} \right) \end{array} \right\} + \\ U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \left(2 c_\beta^2 \delta \mu + \delta A_{j1,j1}^{d*} s_{2\beta} \right) - \\ U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \left(2 c_\beta^2 \delta \mu^* + \delta A_{j1,j1}^d s_{2\beta} \right) \end{array} \right\} \end{array} \right\} - \end{array} \right\} - \\ 2 c_\beta \delta s_W m_{d_{j1}} \left(U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \left(c_\beta \mu + A_{j1,j1}^{d*} s_\beta \right) - U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \left(c_\beta \mu^* + A_{j1,j1}^d s_\beta \right) \right) \\ m_{d_{j1}} s_W \left\{ \begin{array}{l} (c_\beta \delta M_W^2 + M_W^2 (2 \delta c_\beta - c_\beta (2 \delta Z_e + \delta Z_{AA}))) \left(U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \left(c_\beta \mu + A_{j1,j1}^{d*} s_\beta \right) - U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \left(c_\beta \mu^* + A_{j1,j1}^d s_\beta \right) \right) - \\ c_\beta \delta Z_{AG} M_W^2 \left(U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \left(A_{j1,j1}^d c_\beta - \mu^* s_\beta \right) - U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \left(A_{j1,j1}^{d*} c_\beta - \mu s_\beta \right) \right) \end{array} \right\} \right\}$$

$$C_{219}(G^0, \tilde{d}_{j_1}^{s1}, \tilde{d}_{j_2}^{s2,\dagger}) = \frac{e \delta_{j_1, j_2}}{4 c_\beta^2 M_W^3 s_W^2}$$

$$C(h^0, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2, \dagger}) = -\frac{i e \delta_{j1,j2}}{12}$$

$$\left\{ \begin{array}{l} \frac{1}{M_W s_\beta} \left\{ \frac{1}{s_W} \left\{ \frac{1}{c_W} \left\{ \begin{array}{l} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} \left\{ \begin{array}{l} U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} 3 c_W m_{u_{j1}} U_{1,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) + \right. \\ \left. U_{1,2}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 - 4 M_W M_Z s_{\alpha+\beta} s_\beta s_W^2 \right) \right\} + \\ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{1,1}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 + M_W M_Z s_{\alpha+\beta} s_\beta (1 - 4 c_W^2) \right) + \\ 3 c_W m_{u_{j1}} U_{1,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \end{array} \right\} + \\ U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} 3 c_W m_{u_{j1}} U_{2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) + \\ U_{2,2}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 - 4 M_W M_Z s_{\alpha+\beta} s_\beta s_W^2 \right) \right\} + \\ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{2,1}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 + M_W M_Z s_{\alpha+\beta} s_\beta (1 - 4 c_W^2) \right) + \\ 3 c_W m_{u_{j1}} U_{2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \end{array} \right\} \end{array} \right\} + \\ 6 m_{u_{j1}} \left(U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \delta A_{j1,j1}^{u*} + \delta \mu^* s_\alpha \right) + U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \delta A_{j1,j1}^{u*} + \delta \mu s_\alpha \right) \right) \\ \frac{1}{c_W s_W^2} \left\{ \begin{array}{l} U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} c_W \left\{ \begin{array}{l} 3 m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left\{ \begin{array}{l} \mu (2 \delta s_W s_\alpha + c_\alpha \delta Z_{hH} s_W) + \\ A_{j1,j1}^{u*} (2 c_\alpha \delta s_W - \delta Z_{hH} s_\alpha s_W) \end{array} \right\} + \\ 6 m_{u_{j1}}^2 U_{s2,2}^{\tilde{u},j1} (2 c_\alpha \delta s_W - \delta Z_{hH} s_\alpha s_W) \end{array} \right\} + \\ 4 M_W M_Z s_\beta s_W^2 U_{s2,2}^{\tilde{u},j1} (2 \delta s_W s_{\alpha+\beta} - c_{\alpha+\beta} \delta Z_{hH} s_W) \end{array} \right\} + \\ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{u},j1} \left\{ \begin{array}{l} M_W M_Z s_\beta (c_{\alpha+\beta} \delta Z_{hH} s_W (1 - 4 c_W^2) - 2 \delta s_W s_{\alpha+\beta} (7 - 4 c_W^2)) + \\ 6 c_W m_{u_{j1}}^2 (2 c_\alpha \delta s_W - \delta Z_{hH} s_\alpha s_W) \end{array} \right\} + \\ 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u (2 c_\alpha \delta s_W - \delta Z_{hH} s_\alpha s_W) + \mu^* (2 \delta s_W s_\alpha + c_\alpha \delta Z_{hH} s_W) \right) \end{array} \right\} \end{array} \right\} + \end{array} \right\} \left\{ \begin{array}{l} 6 \delta m_{j1}^u \left\{ \begin{array}{l} U_{s1,1}^{\tilde{u},j1*} \left(4 c_\alpha m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} + U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \right) + \\ U_{s1,2}^{\tilde{u},j1*} \left(4 c_\alpha m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} + U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) \right) \end{array} \right\} + \\ \delta Z_{1,s1}^{\tilde{u},j1} \left\{ \begin{array}{l} U_{1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) + \\ U_{s2,2}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 - 4 M_W M_Z s_{\alpha+\beta} s_\beta s_W^2 \right) \right\} + \\ U_{1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 + M_W M_Z s_{\alpha+\beta} s_\beta (1 - 4 c_W^2) \right) + \\ 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \end{array} \right\} + \\ U_{2,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) + \\ U_{s2,2}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 - 4 M_W M_Z s_{\alpha+\beta} s_\beta s_W^2 \right) \right\} + \\ U_{s2,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 + M_W M_Z s_{\alpha+\beta} s_\beta (1 - 4 c_W^2) \right) + \\ 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \end{array} \right\} \end{array} \right\} + \\ (2 \delta Z_e + \delta Z_{hh}) \left\{ \begin{array}{l} U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) + \\ U_{s2,2}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 - 4 M_W M_Z s_{\alpha+\beta} s_\beta s_W^2 \right) \right\} + \\ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 + M_W M_Z s_{\alpha+\beta} s_\beta (1 - 4 c_W^2) \right) + \\ 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \end{array} \right\} \end{array} \right\} \end{array} \right\} \left\{ \begin{array}{l} + \\ - \\ - \end{array} \right\} \end{array} \right\} \left\{ \begin{array}{l} + \\ - \\ - \end{array} \right\} \end{array} \right\}$$

$$\begin{aligned}
C(H^0, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2, \dagger}) = & -\frac{ie \delta_{j1,j2}}{12 s_W^2} \left\{ \right. \\
& \frac{1}{c_W M_W s_\beta} \left\{ \right. \\
& \quad s_W \left\{ \right. \\
& \quad \quad 2 \delta_{SW} \left\{ \begin{array}{l} U_{s1,1}^{\tilde{u},j1*} \left(3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) - U_{s2,1}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha + c_{\alpha+\beta} M_W M_Z s_\beta (7 - 4 c_W^2) \right) \right) + \\ U_{s1,2}^{\tilde{u},j1*} \left(3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) - U_{s2,2}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha - 4 c_{\alpha+\beta} M_W M_Z s_\beta s_W^2 \right) \right) \end{array} \right\} - \\
& \quad \delta Z_{1,s1}^{\tilde{u},j1} \left\{ \begin{array}{l} U_{1,2}^{\tilde{u},j1*} \left\{ 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) - \right. \\ \left. 2 U_{s2,2}^{\tilde{u},j1} \left(3 c_W m_{u_{j1}}^2 s_\alpha + 2 c_{\alpha+\beta} M_W M_Z s_\beta s_W^2 \right) \right\} - \\ U_{1,1}^{\tilde{u},j1*} \left\{ U_{s2,1}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha - c_{\alpha+\beta} M_W M_Z s_\beta (1 - 4 c_W^2) \right) - \right. \\ \left. 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) \right\} \end{array} \right\} + \\
& \quad \delta Z_{2,s1}^{\tilde{u},j1} \left\{ \begin{array}{l} U_{2,2}^{\tilde{u},j1*} \left\{ 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) - \right. \\ \left. 2 U_{s2,2}^{\tilde{u},j1} \left(3 c_W m_{u_{j1}}^2 s_\alpha + 2 c_{\alpha+\beta} M_W M_Z s_\beta s_W^2 \right) \right\} - \\ U_{2,1}^{\tilde{u},j1*} \left\{ U_{s2,1}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha - c_{\alpha+\beta} M_W M_Z s_\beta (1 - 4 c_W^2) \right) - \right. \\ \left. 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) \right\} \end{array} \right\} + \\
& \quad (2 \delta Z_e + \delta Z_{HH}) \left\{ \begin{array}{l} U_{s1,2}^{\tilde{u},j1*} \left\{ 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) - \right. \\ \left. 2 U_{s2,2}^{\tilde{u},j1} \left(3 c_W m_{u_{j1}}^2 s_\alpha + 2 c_{\alpha+\beta} M_W M_Z s_\beta s_W^2 \right) \right\} - \\ U_{s1,1}^{\tilde{u},j1*} \left\{ U_{s2,1}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha - c_{\alpha+\beta} M_W M_Z s_\beta (1 - 4 c_W^2) \right) - \right. \\ \left. 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) \right\} \end{array} \right\} \left. \right\} + \\
& \frac{1}{M_W s_\beta} \left\{ \right. \\
& \quad \frac{\delta Z_{bH}}{c_W} \left\{ \begin{array}{l} U_{s1,2}^{\tilde{u},j1*} \left\{ 3 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(A_{j1,j1}^{u*} c_\alpha + \mu s_\alpha \right) + \right. \\ \left. U_{s2,2}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 - 4 M_W M_Z s_{\alpha+\beta} s_\beta s_W^2 \right) \right\} + \\ U_{s1,1}^{\tilde{u},j1*} \left\{ U_{s2,1}^{\tilde{u},j1} \left(6 c_\alpha c_W m_{u_{j1}}^2 + M_W M_Z s_{\alpha+\beta} s_\beta (1 - 4 c_W^2) \right) + \right. \\ \left. 3 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\alpha + \mu^* s_\alpha \right) \right\} \end{array} \right\} + \\
& \quad 6 \delta m_{j1}^u \left\{ \begin{array}{l} U_{s1,1}^{\tilde{u},j1*} \left(4 m_{u_{j1}} s_\alpha U_{s2,1}^{\tilde{u},j1} - U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) \right) + \\ U_{s1,2}^{\tilde{u},j1*} \left(4 m_{u_{j1}} s_\alpha U_{s2,2}^{\tilde{u},j1} - U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) \right) \end{array} \right\} \left. \right\} + \\
& s_W \left\{ \right. \\
& \quad \frac{1}{c_W} \left\{ \right. \\
& \quad \quad \frac{1}{M_W s_\beta} \left\{ \right. \\
& \quad \quad \quad U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} \left\{ U_{1,1}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha - c_{\alpha+\beta} M_W M_Z s_\beta (1 - 4 c_W^2) \right) - \right. \\ \left. 3 c_W m_{u_{j1}} U_{1,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) \right\} + \\ \delta \bar{Z}_{2,s2}^{\tilde{u},j2} \left\{ U_{2,1}^{\tilde{u},j1} \left(6 c_W m_{u_{j1}}^2 s_\alpha - c_{\alpha+\beta} M_W M_Z s_\beta (1 - 4 c_W^2) \right) - \right. \\ \left. 3 c_W m_{u_{j1}} U_{2,2}^{\tilde{u},j1} \left(c_\alpha \mu^* - A_{j1,j1}^u s_\alpha \right) \right\} - \end{array} \right\} + \\
& \quad \quad \quad 6 c_W m_{u_{j1}} U_{s2,2}^{\tilde{u},j1} \left(c_\alpha \delta \mu^* - \delta A_{j1,j1}^u s_\alpha \right) \left. \right\} + \\
& \quad \quad \quad U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} \left\{ 4 c_{\alpha+\beta} M_W M_Z s_\beta s_W^2 U_{1,2}^{\tilde{u},j1} + \right. \\ \left. c_W \left(6 m_{u_{j1}}^2 s_\alpha U_{1,2}^{\tilde{u},j1} - 3 m_{u_{j1}} U_{1,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) \right) \right\} + \\ \delta \bar{Z}_{2,s2}^{\tilde{u},j2} \left\{ 4 c_{\alpha+\beta} M_W M_Z s_\beta s_W^2 U_{2,2}^{\tilde{u},j1} + \right. \\ \left. c_W \left(6 m_{u_{j1}}^2 s_\alpha U_{2,2}^{\tilde{u},j1} - 3 m_{u_{j1}} U_{2,1}^{\tilde{u},j1} \left(c_\alpha \mu - A_{j1,j1}^{u*} s_\alpha \right) \right) \right\} - \end{array} \right\} - \\
& \quad \quad \quad 6 c_W m_{u_{j1}} U_{s2,1}^{\tilde{u},j1} \left(c_\alpha \delta \mu - \delta A_{j1,j1}^{u*} s_\alpha \right) \left. \right\} \left. \right\} + \\
& \quad \left. \right\} - \\
& \left. \right\}
\end{aligned}$$

$$C_{226}(h^0, \tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = \frac{\mathrm{i} e \delta_{j1,j2}}{12}$$

$$\begin{aligned}
& \left\{ \frac{1}{c_\beta M_W} \right\} \left\{ \frac{1}{s_W} \right\} \left\{ \frac{1}{c_W} \right\} \left\{ \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} 3 c_W m_{d_1} U_{1,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*}) + \\ U_{1,2}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2) \end{array} \right\} + \right. \right. \\ & \quad \left. U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{array}{l} U_{1,1}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (1+2 c_W^2)) + \\ 3 c_W m_{d_1} U_{1,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \end{array} \right\} + \right\} \\ & \quad \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left\{ U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} 3 c_W m_{d_1} U_{2,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*}) + \\ U_{2,2}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2) \end{array} \right\} + \right. \\ & \quad \left. U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{array}{l} U_{2,1}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (1+2 c_W^2)) + \\ 3 c_W m_{d_1} U_{2,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \end{array} \right\} + \right\} \\ & \quad 6 m_{d_1} \left(U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} (c_\alpha \delta \mu + \delta A_{j1,j1}^{d*} s_\alpha) + U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} (c_\alpha \delta \mu^* + \delta A_{j1,j1}^d s_\alpha) \right) \\ & \quad \left. \frac{2 \delta s_W}{c_W s_W^2} \left\{ \begin{array}{l} U_{s1,1}^{\tilde{d},j1*} \left(3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) + U_{s2,1}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (5-2 c_W^2)) \right) + \\ U_{s1,2}^{\tilde{d},j1*} \left(2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2 U_{s2,2}^{\tilde{d},j1} + c_W (6 m_{d_1}^2 s_\alpha U_{s2,2}^{\tilde{d},j1} + 3 m_{d_1} U_{s2,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*} s_\alpha)) \right) \right\} \right\} + \Bigg\} \\ & \left\{ \frac{1}{c_\beta M_W} \right\} \left\{ \frac{1}{c_W} \right\} \left\{ 6 \delta m_{j1}^d \left\{ \begin{array}{l} U_{s1,1}^{\tilde{d},j1*} \left(4 m_{d_1} s_\alpha U_{s2,1}^{\tilde{d},j1} + U_{s2,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \right) + \\ U_{s1,2}^{\tilde{d},j1*} \left(4 m_{d_1} s_\alpha U_{s2,2}^{\tilde{d},j1} + U_{s2,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*} s_\alpha) \right) \end{array} \right\} - \right. \\ & \quad \delta Z_{hH} \left\{ \begin{array}{l} U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha) + \\ 2 U_{s2,2}^{\tilde{d},j1} (3 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{array} \right\} + \\ U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j1} (6 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z (1+2 c_W^2)) + \\ 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (A_{j1,j1}^d c_\alpha - \mu^* s_\alpha) \end{array} \right\} \end{array} \right\} - \\ & \quad \delta Z_{1,s1}^{\tilde{d},j1} \left\{ \begin{array}{l} U_{1,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*} s_\alpha) + \\ U_{s2,2}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2) \end{array} \right\} + \\ U_{1,1}^{\tilde{d},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (1+2 c_W^2)) + \\ 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \end{array} \right\} \end{array} \right\} - \\ & \quad \delta Z_{2,s1}^{\tilde{d},j1} \left\{ \begin{array}{l} U_{2,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*} s_\alpha) + \\ U_{s2,2}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2) \end{array} \right\} + \\ U_{2,1}^{\tilde{d},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (1+2 c_W^2)) + \\ 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \end{array} \right\} \end{array} \right\} - \\ & \quad (2 \delta Z_e + \delta Z_{hh}) \left\{ \begin{array}{l} U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*} s_\alpha) + \\ U_{s2,2}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - 2 c_\beta M_W M_Z s_{\alpha+\beta} s_W^2) \end{array} \right\} + \\ U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j1} (6 c_W m_{d_1}^2 s_\alpha - c_\beta M_W M_Z s_{\alpha+\beta} (1+2 c_W^2)) + \\ 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \end{array} \right\} \end{array} \right\} \Bigg\} - \Bigg\} \\ & \left\{ \frac{1}{s_W} \right\} \left\{ \frac{1}{c_\beta M_W} \right\} \left\{ \frac{1}{c_W} \right\} \left\{ \begin{array}{l} U_{s1,1}^{\tilde{d},j1*} \left(2 m_{d_1} s_\alpha U_{s2,2}^{\tilde{d},j1} + U_{s2,1}^{\tilde{d},j1} (c_\alpha \mu^* + A_{j1,j1}^d s_\alpha) \right) + \\ U_{s1,2}^{\tilde{d},j1*} \left(2 m_{d_1} s_\alpha U_{s2,1}^{\tilde{d},j1} + U_{s2,2}^{\tilde{d},j1} (c_\alpha \mu + A_{j1,j1}^{d*} s_\alpha) \right) \end{array} \right\} \Bigg\} - \Bigg\}
\end{aligned}$$

$$\begin{aligned}
C(H^0, \tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = & -\frac{i e \delta_{j1,j2}}{12} \left\{ \frac{1}{c_\beta c_W M_W} \left\{ \frac{1}{s_W^2} \left\{ U_{s1,2}^{\tilde{d},j1*} \left\{ c_W \left\{ \begin{aligned} & 3 m_{d_1} U_{s2,1}^{\tilde{d},j1} \left\{ \begin{aligned} & \mu (2 \delta s_W s_\alpha - c_\alpha \delta Z_{hH} s_W) - \\ & A_{j1,j1}^{d*} (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) \end{aligned} \right\} - \right\} - \right\} + \\ & 6 m_{d_1}^2 U_{s2,2}^{\tilde{d},j1} (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) \\ & 2 c_\beta M_W M_Z s_W^2 U_{s2,2}^{\tilde{d},j1} (2 c_{\alpha+\beta} \delta s_W - \delta Z_{hH} s_{\alpha+\beta} s_W) \end{aligned} \right\} - \right\} + \\ U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta M_W M_Z (\delta Z_{hH} s_{\alpha+\beta} s_W (1 + 2 c_W^2) + 2 c_{\alpha+\beta} \delta s_W (5 - 2 c_W^2)) - \\ & 6 c_W m_{d_1}^2 (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) \end{aligned} \right\} - \right\} \\ 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (A_{j1,j1}^d (2 c_\alpha \delta s_W + \delta Z_{hH} s_\alpha s_W) - \mu^* (2 \delta s_W s_\alpha - c_\alpha \delta Z_{hH} s_W)) \end{aligned} \right\} + \\ \frac{1}{s_W} \left\{ U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ \begin{aligned} & U_{1,1}^{\tilde{d},j1} (6 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z (1 + 2 c_W^2)) + \end{aligned} \right\} + \\ & 3 c_W m_{d_1} U_{1,2}^{\tilde{d},j1} (A_{j1,j1}^d c_\alpha - \mu^* s_\alpha) \end{aligned} \right\} + \\ \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left\{ \begin{aligned} & U_{2,1}^{\tilde{d},j1} (6 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z (1 + 2 c_W^2)) + \end{aligned} \right\} + \\ 3 c_W m_{d_1} U_{2,2}^{\tilde{d},j1} (A_{j1,j1}^d c_\alpha - \mu^* s_\alpha) \end{aligned} \right\} + \\ 6 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (c_\alpha \delta A_{j1,j1}^d - \delta \mu^* s_\alpha) \end{aligned} \right\} - \right\} \\ U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ \begin{aligned} & 2 c_{\alpha+\beta} c_\beta M_W M_Z s_W^2 U_{1,2}^{\tilde{d},j1} - \\ & c_W (6 c_\alpha m_{d_1}^2 U_{1,2}^{\tilde{d},j1} + 3 m_{d_1} U_{1,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha)) \end{aligned} \right\} + \\ & \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left\{ \begin{aligned} & 2 c_{\alpha+\beta} c_\beta M_W M_Z s_W^2 U_{2,2}^{\tilde{d},j1} - \\ & c_W (6 c_\alpha m_{d_1}^2 U_{2,2}^{\tilde{d},j1} + 3 m_{d_1} U_{2,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha)) \end{aligned} \right\} - \end{aligned} \right\} \\ 6 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (c_\alpha \delta A_{j1,j1}^{d*} - \delta \mu s_\alpha) \end{aligned} \right\} \end{aligned} \right\} + \\ \frac{c_\beta}{M_W} \left\{ \frac{1}{c_W} \left\{ 6 \delta m_{j1}^d \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1*} (4 c_\alpha m_{d_1} U_{s2,1}^{\tilde{d},j1} + U_{s2,2}^{\tilde{d},j1} (A_{j1,j1}^d c_\alpha - \mu^* s_\alpha)) + \\ & U_{s1,2}^{\tilde{d},j1*} (4 c_\alpha m_{d_1} U_{s2,2}^{\tilde{d},j1} + U_{s2,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha)) \end{aligned} \right\} + \\ \delta Z_{1,s1}^{\tilde{d},j1} \left\{ \begin{aligned} & U_{1,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha) + \\ & 2 U_{s2,2}^{\tilde{d},j1} (3 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{aligned} \right\} + \\ & U_{1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1} (6 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z (1 + 2 c_W^2)) + \\ & 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (A_{j1,j1}^d c_\alpha - \mu^* s_\alpha) \end{aligned} \right\} \end{aligned} \right\} + \\ \delta Z_{2,s1}^{\tilde{d},j1} \left\{ \begin{aligned} & U_{2,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha) + \\ & 2 U_{s2,2}^{\tilde{d},j1} (3 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{aligned} \right\} + \\ & U_{2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1} (6 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z (1 + 2 c_W^2)) + \\ & 3 c_W m_{d_1} U_{s2,2}^{\tilde{d},j1} (A_{j1,j1}^d c_\alpha - \mu^* s_\alpha) \end{aligned} \right\} \end{aligned} \right\} + \\ (2 \delta Z_e + \delta Z_{HH}) \left\{ \begin{aligned} & U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & 3 c_W m_{d_1} U_{s2,1}^{\tilde{d},j1} (A_{j1,j1}^{d*} c_\alpha - \mu s_\alpha) + \\ & 2 U_{s2,2}^{\tilde{d},j1} (3 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z s_W^2) \end{aligned} \right\} + \\ & U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1} (6 c_\alpha c_W m_{d_1}^2 - c_{\alpha+\beta} c_\beta M_W M_Z (1 + 2 c_W^2)) + \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \right\} - \right\}
\end{aligned}$$

$$\begin{aligned}
C(H^+, \tilde{d}_{j2}^2, \tilde{u}_{j1}^{s1,\dagger}) = & -\frac{ie}{2\sqrt{2}M_W s_W^2} \left\{ \frac{2}{s_{2\beta}} \left\{ s_W \left\{ (2\delta\text{CKM}_{j1,j2} + \delta\bar{Z}_{H-H} \text{CKM}_{j1,j2}) \left\{ U_{s2,1}^{\tilde{d},j2*} \left\{ \frac{U_{s1,1}^{\tilde{u},j1} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_1}^2 - m_{d_2}^2 s_\beta^2 \right) -}{\frac{m_{u_1} U_{s1,2}^{\tilde{u},j1}}{2}} \left(2A_{j1,j1}^u c_\beta^2 + \mu^* s_{2\beta} \right) \right\} - \right\} + \right. \right. \\
& \left. \left. \frac{\delta M_W^2 \text{CKM}_{j1,j2}}{M_W^2} \left\{ m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} + s_\beta U_{s1,1}^{\tilde{u},j1} \left(c_\beta \mu + A_{j2,j2}^{d*} s_\beta \right) \right) + \right. \right. \right. \\
& \left. \left. \left. U_{s2,1}^{\tilde{d},j2*} \left(c_\beta m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) + U_{s1,1}^{\tilde{u},j1} \left(c_\beta^2 m_{u_1}^2 + s_\beta^2 \left(m_{d_2}^2 + 2c_\beta^2 M_W^2 \right) \right) \right) \right\} \right\} + \right. \\
& \left. \text{CKM}_{j1,j2} (2\delta s_W - 2\delta Z_e s_W) \left\{ U_{s2,1}^{\tilde{d},j2*} \left\{ \frac{U_{s1,1}^{\tilde{u},j1} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_1}^2 - m_{d_2}^2 s_\beta^2 \right) -}{\frac{m_{u_1} U_{s1,2}^{\tilde{u},j1}}{2}} \left(2A_{j1,j1}^u c_\beta^2 + \mu^* s_{2\beta} \right) \right\} - \right. \right. \\
& \left. \left. m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} + s_\beta U_{s1,1}^{\tilde{u},j1} \left(c_\beta \mu + A_{j2,j2}^{d*} s_\beta \right) \right) \right\} \right\} \right\} + \\
& 2 \left\{ \frac{\delta c_\beta}{c_\beta^2} \left\{ s_\beta U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \left(m_{d_2}^2 + c_\beta^2 M_W^2 \right) + \right. \right. \\
& \left. \left. m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left(m_{u_1} s_\beta U_{s1,2}^{\tilde{u},j1} + U_{s1,1}^{\tilde{u},j1} \left(c_\beta \mu + A_{j2,j2}^{d*} s_\beta \right) \right) \right\} + \right. \\
& \left. \frac{\delta s_\beta}{s_\beta^2} \left\{ c_\beta m_{d_2} m_{u_1} U_{s1,2}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*} + \right. \right. \\
& \left. \left. U_{s2,1}^{\tilde{d},j2*} \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right) + c_\beta U_{s1,1}^{\tilde{u},j1} \left(m_{u_1}^2 + M_W^2 s_\beta^2 \right) \right) \right\} \right\} + \\
& \text{CKM}_{j1,j2} s_W \left\{ \delta\bar{Z}_{1,s1}^{\tilde{u},j1} \left\{ U_{s2,1}^{\tilde{d},j2*} \left\{ \frac{U_{s1,1}^{\tilde{u},j1} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_1}^2 - m_{d_2}^2 s_\beta^2 \right) -}{c_\beta m_{u_1} U_{1,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right)} \right\} - \right. \right. \\
& \left. \left. m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left(m_{u_1} U_{1,2}^{\tilde{u},j1} + s_\beta U_{1,1}^{\tilde{u},j1} \left(c_\beta \mu + A_{j2,j2}^{d*} s_\beta \right) \right) \right\} + \right. \\
& \delta\bar{Z}_{2,s1}^{\tilde{u},j1} \left\{ U_{s2,1}^{\tilde{d},j2*} \left\{ \frac{U_{s1,1}^{\tilde{u},j1} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_1}^2 - m_{d_2}^2 s_\beta^2 \right) -}{c_\beta m_{u_1} U_{2,2}^{\tilde{u},j1} \left(A_{j1,j1}^u c_\beta + \mu^* s_\beta \right)} \right\} - \right. \\
& \left. \left. m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left(m_{u_1} U_{2,2}^{\tilde{u},j1} + s_\beta U_{2,1}^{\tilde{u},j1} \left(c_\beta \mu + A_{j2,j2}^{d*} s_\beta \right) \right) \right\} + \right. \\
& \frac{1}{s_{2\beta}} \left\{ \delta Z_{G-H}^* \left\{ m_{d_2} s_\beta U_{s1,1}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*} \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) + \right. \right. \\
& \left. \left. c_\beta U_{s2,1}^{\tilde{d},j2*} \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) + s_\beta U_{s1,1}^{\tilde{u},j1} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \right) \right\} - \right. \\
& U_{s2,2}^{\tilde{d},j2*} \left\{ m_{d_2} \left(2\delta m_{j1}^u U_{s1,2}^{\tilde{u},j1} + U_{s1,1}^{\tilde{u},j1} \left(\delta\mu s_{2\beta} + 2\delta A_{j2,j2}^{d*} s_\beta^2 \right) \right) + \right. \\
& \left. \delta m_{j2}^d \left(2m_{u_1} U_{s1,2}^{\tilde{u},j1} + U_{s1,1}^{\tilde{u},j1} \left(\mu s_{2\beta} + 2A_{j2,j2}^{d*} s_\beta^2 \right) \right) \right\} - \\
& U_{s2,1}^{\tilde{d},j2*} \left\{ 4\delta m_{j2}^d m_{d_2} s_\beta^2 U_{s1,1}^{\tilde{u},j1} + m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(2c_\beta^2 \delta A_{j1,j1}^u + \delta\mu^* s_{2\beta} \right) + \right. \\
& \left. \delta m_{j1}^u \left(4c_\beta^2 m_{u_1} U_{s1,1}^{\tilde{u},j1} + U_{s1,2}^{\tilde{u},j1} \left(2A_{j1,j1}^u c_\beta^2 + \mu^* s_{2\beta} \right) \right) \right\} \\
& m_{d_2} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2*} \right) \left(2m_{u_1} U_{s1,2}^{\tilde{u},j1} + U_{s1,1}^{\tilde{u},j1} \left(\mu s_{2\beta} + 2A_{j2,j2}^{d*} s_\beta^2 \right) \right) - \\
& \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(2A_{j1,j1}^u c_\beta^2 + \mu^* s_{2\beta} \right) - U_{s1,1}^{\tilde{u},j1} \left(M_W^2 s_{2\beta}^2 - 2 \left(c_\beta^2 m_{u_1}^2 + m_{d_2}^2 s_\beta^2 \right) \right) \right) \right\} \right\}
\end{aligned}$$

$$C(H^-, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = \frac{ie}{2\sqrt{2}M_W s_{2\beta}^2}$$

$$\left\{ \begin{array}{l} \frac{2}{s_{2\beta}} \left\{ \begin{array}{l} \text{CKM}_{j1,j2}^* \left\{ \begin{array}{l} (2\delta s_W - 2\delta Z_e s_W) \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j2} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_{j1}}^2 - m_{d_{j2}}^2 s_\beta^2 \right) - \\ \frac{m_{d_{j2}} U_{s2,2}^{\tilde{d},j2}}{2} \left(\mu^* s_{2\beta} + 2A_{j2,j2}^d s_\beta^2 \right) \end{array} \right\} - \\ m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} \left(m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} + c_\beta U_{s2,1}^{\tilde{d},j2} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{array} \right\} - \\ \frac{s_W}{2} \left\{ \begin{array}{l} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \left\{ U_{s2,1}^{\tilde{d},j2} \left(M_W^2 s_{2\beta}^2 - 2 \left(c_\beta^2 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^2 \right) \right) - \\ m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} \left(\mu^* s_{2\beta} + 2A_{j2,j2}^d s_\beta^2 \right) \end{array} \right\} - \\ m_{u_{j1}} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \left(2m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} + U_{s2,1}^{\tilde{d},j2} \left(2A_{j1,j1}^{u*} c_\beta + \mu s_{2\beta} \right) \right) \end{array} \right\} - \end{array} \right\} \\ \left(2\delta \text{CKM}_{j1,j2}^* + \delta Z_{H-H-} \text{CKM}_{j1,j2}^* \right) \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j2} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_{j1}}^2 - m_{d_{j2}}^2 s_\beta^2 \right) - \\ \frac{m_{d_{j2}} U_{s2,2}^{\tilde{d},j2}}{2} \left(\mu^* s_{2\beta} + 2A_{j2,j2}^d s_\beta^2 \right) \end{array} \right\} - \\ m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} \left(m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} + c_\beta U_{s2,1}^{\tilde{d},j2} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{array} \right\} + \end{array} \right\} \\ s_W \left\{ \begin{array}{l} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} \left\{ U_{s2,1}^{\tilde{d},j2} \left\{ \begin{array}{l} \mu \left(2c_\beta^2 \delta Z_{G-H-} M_W^2 + \delta M_W^2 s_{2\beta} \right) + \\ A_{j1,j1}^{u*} \left(2c_\beta^2 \delta M_W^2 - \delta Z_{G-H-} M_W^2 s_{2\beta} \right) \end{array} \right\} + \\ 2\delta M_W^2 m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} \end{array} \right\} + \\ \frac{\text{CKM}_{j1,j2}^*}{2M_W^2} \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j2} \left\{ \begin{array}{l} \delta Z_{G-H-} M_W^2 s_{2\beta} \left(m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta} M_W^2 \right) + \\ \delta M_W^2 \left(M_W^2 s_{2\beta}^2 + 2 \left(c_\beta^2 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^2 \right) \right) \end{array} \right\} + \\ m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} \left\{ \begin{array}{l} A_{j2,j2}^d \left(\delta Z_{G-H-} M_W^2 s_{2\beta} + 2\delta M_W^2 s_\beta^2 \right) + \\ \mu^* \left(\delta M_W^2 s_{2\beta} - 2\delta Z_{G-H-} M_W^2 s_\beta^2 \right) \end{array} \right\} \end{array} \right\} + \end{array} \right\} \end{array} \right\} \\ \text{CKM}_{j1,j2}^* s_W \left\{ \begin{array}{l} \frac{2}{s_{2\beta}^2} \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{d},j2} \left(M_W^2 s_{2\beta}^2 \left(c_\beta \delta s_\beta + \delta c_\beta s_\beta \right) + 4 \left(c_\beta^3 \delta s_\beta m_{u_{j1}}^2 + \delta c_\beta m_{d_{j2}}^2 s_\beta^3 \right) \right) + \\ 2\delta c_\beta m_{d_{j2}} s_\beta U_{s2,2}^{\tilde{d},j2} \left(\mu^* s_{2\beta} + 2A_{j2,j2}^d s_\beta^2 \right) \end{array} \right\} + \\ 2m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} \left(c_\beta \delta s_\beta U_{s2,1}^{\tilde{d},j2} \left(2A_{j1,j1}^{u*} c_\beta + \mu s_{2\beta} \right) + 2m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} \left(c_\beta^3 \delta s_\beta + \delta c_\beta s_\beta^3 \right) \right) \end{array} \right\} - \\ \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} c_\beta^2 m_{u_{j1}}^2 U_{1,1}^{\tilde{d},j2} + \\ s_\beta \left(m_{d_{j2}} U_{1,2}^{\tilde{d},j2} \left(c_\beta \mu^* + A_{j2,j2}^d s_\beta \right) - U_{1,1}^{\tilde{d},j2} \left(c_\beta M_W^2 s_{2\beta} - m_{d_{j2}}^2 s_\beta \right) \right) \end{array} \right\} + \\ m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} \left(m_{d_{j2}} U_{1,2}^{\tilde{d},j2} + c_\beta U_{1,1}^{\tilde{d},j2} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{array} \right\} + \\ \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} c_\beta^2 m_{u_{j1}}^2 U_{2,1}^{\tilde{d},j2} + \\ s_\beta \left(m_{d_{j2}} U_{2,2}^{\tilde{d},j2} \left(c_\beta \mu^* + A_{j2,j2}^d s_\beta \right) - U_{2,1}^{\tilde{d},j2} \left(c_\beta M_W^2 s_{2\beta} - m_{d_{j2}}^2 s_\beta \right) \right) \end{array} \right\} + \\ m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} \left(m_{d_{j2}} U_{2,2}^{\tilde{d},j2} + c_\beta U_{2,1}^{\tilde{d},j2} \left(A_{j1,j1}^{u*} c_\beta + \mu s_\beta \right) \right) \end{array} \right\} + \\ U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} m_{u_{j1}} \left(2\delta m_{j2}^d U_{s2,2}^{\tilde{d},j2} + U_{s2,1}^{\tilde{d},j2} \left(2c_\beta^2 \delta A_{j1,j1}^{u*} + \delta \mu s_{2\beta} \right) \right) + \\ \delta m_{j1}^u \left(2m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} + U_{s2,1}^{\tilde{d},j2} \left(2A_{j1,j1}^{u*} c_\beta + \mu s_{2\beta} \right) \right) \end{array} \right\} + \\ U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} 4c_\beta^2 \delta m_{j1}^u m_{u_{j1}} U_{s2,1}^{\tilde{d},j2} + m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} \left(\delta \mu^* s_{2\beta} + 2\delta A_{j2,j2}^d s_\beta^2 \right) + \\ \delta m_{j2}^d \left(4m_{d_{j2}} s_\beta^2 U_{s2,1}^{\tilde{d},j2} + U_{s2,2}^{\tilde{d},j2} \left(\mu^* s_{2\beta} + 2A_{j2,j2}^d s_\beta^2 \right) \right) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$\begin{aligned}
C(G^+, \tilde{d}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}) = & \frac{ie}{2\sqrt{2}M_W s_W^2} \left\{ \frac{2}{s_{2\beta}} \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left\{ U_{s1,1}^{\tilde{u},j1} \left\{ \begin{aligned} & \mu \left(\delta Z_{G-H} - M_W^2 s_{2\beta} - 2\delta M_W^2 s_\beta^2 \right) + \right. \\ & A_{j2,j2}^{d*} \left(\delta M_W^2 s_{2\beta} + 2\delta Z_{G-H} - M_W^2 s_\beta^2 \right) \end{aligned} \right\} + \\ & 2\delta Z_{G-H} - m_{u_1} M_W^2 U_{s1,2}^{\tilde{u},j1} \end{aligned} \right\} + \\ & U_{s2,1}^{\tilde{d},j2*} \left\{ \begin{aligned} & M_W^2 s_{2\beta} \left(c_{2\beta} \delta M_W^2 - \delta Z_{G-H} - M_W^2 s_{2\beta} \right) + \\ & m_{u_1}^2 \left(2c_\beta^2 \delta Z_{G-H} - M_W^2 - \delta M_W^2 s_{2\beta} \right) + \\ & m_{d_2}^2 \left(\delta M_W^2 s_{2\beta} + 2\delta Z_{G-H} - M_W^2 s_\beta^2 \right) \end{aligned} \right\} + \\ & m_{u_1} U_{s1,2}^{\tilde{u},j1} \left\{ \begin{aligned} & A_{j1,j1}^u \left(2c_\beta^2 \delta Z_{G-H} - M_W^2 - \delta M_W^2 s_{2\beta} \right) + \\ & \mu^* \left(2c_\beta^2 \delta M_W^2 + \delta Z_{G-H} - M_W^2 s_{2\beta} \right) \end{aligned} \right\} \end{aligned} \right\} - \\ & (2\delta \text{CKM}_{j1,j2} + \delta Z_{G-G} - \text{CKM}_{j1,j2}) \left\{ \begin{aligned} & m_{d_2} s_\beta U_{s1,1}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*} \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) + \\ & c_\beta U_{s2,1}^{\tilde{d},j2*} \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) + s_\beta U_{s1,1}^{\tilde{u},j1} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \right) \end{aligned} \right\} \\ & \text{CKM}_{j1,j2} (2\delta s_W - 2\delta Z_e s_W) \left\{ \begin{aligned} & m_{d_2} s_\beta U_{s1,1}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*} \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) + \\ & c_\beta U_{s2,1}^{\tilde{d},j2*} \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) + s_\beta U_{s1,1}^{\tilde{u},j1} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & 2 \left\{ \begin{aligned} & \frac{U_{s2,1}^{\tilde{d},j2*}}{s_\beta} \left\{ \begin{aligned} & m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(c_\beta \delta \mu^* - \delta A_{j1,j1}^u s_\beta \right) - \\ & \delta m_{j1}^u \left(2m_{u_1} s_\beta U_{s1,1}^{\tilde{u},j1} - U_{s1,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \right) \end{aligned} \right\} + \\ & \frac{U_{s1,1}^{\tilde{u},j1}}{c_\beta} \left\{ \begin{aligned} & 2c_\beta \delta m_{j2}^d m_{d_2} U_{s2,1}^{\tilde{d},j2*} + \\ & U_{s2,2}^{\tilde{d},j2*} \left(\delta m_{j2}^d \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) + m_{d_2} \left(c_\beta \delta A_{j2,j2}^{d*} - \delta \mu s_\beta \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & \delta \bar{Z}_{1,s1}^{\tilde{u},j1} \left\{ \begin{aligned} & \frac{m_{d_2} U_{1,1}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*}}{c_\beta} \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) + \\ & U_{s2,1}^{\tilde{d},j2*} \left(\frac{m_{u_1} U_{1,2}^{\tilde{u},j1}}{s_\beta} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) + U_{1,1}^{\tilde{u},j1} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \right) \end{aligned} \right\} + \\ & \delta \bar{Z}_{2,s1}^{\tilde{u},j1} \left\{ \begin{aligned} & \frac{m_{d_2} U_{2,1}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*}}{c_\beta} \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) + \\ & U_{s2,1}^{\tilde{d},j2*} \left(\frac{m_{u_1} U_{2,2}^{\tilde{u},j1}}{s_\beta} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) + U_{2,1}^{\tilde{u},j1} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \right) \end{aligned} \right\} + \\ & \frac{1}{s_{2\beta}} \left\{ \begin{aligned} & m_{d_2} U_{s1,1}^{\tilde{u},j1} \left(A_{j2,j2}^{d*} s_{2\beta} - 2\mu s_\beta^2 \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2*} \right) + \\ & \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) \left(m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(2c_\beta^2 \mu^* - A_{j1,j1}^u s_{2\beta} \right) + s_{2\beta} U_{s1,1}^{\tilde{u},j1} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \right) \end{aligned} \right\} + \\ & \frac{2\delta s_\beta}{s_\beta^2} \left\{ \begin{aligned} & m_{d_2} m_{u_1} s_\beta U_{s1,2}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*} + \\ & U_{s2,1}^{\tilde{d},j2*} \left(s_\beta U_{s1,1}^{\tilde{u},j1} \left(m_{u_1}^2 + M_W^2 s_\beta^2 \right) - m_{u_1} U_{s1,2}^{\tilde{u},j1} \left(c_\beta \mu^* - A_{j1,j1}^u s_\beta \right) \right) \end{aligned} \right\} - \\ & \frac{2\delta c_\beta}{c_\beta^2} \left(c_\beta U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \left(m_{d_2}^2 + c_\beta^2 M_W^2 \right) + m_{d_2} U_{s2,2}^{\tilde{d},j2*} \left(c_\beta m_{u_1} U_{s1,2}^{\tilde{u},j1} + U_{s1,1}^{\tilde{u},j1} \left(A_{j2,j2}^{d*} c_\beta - \mu s_\beta \right) \right) \right) \end{aligned} \right\} - \end{aligned}
\end{aligned}$$

$$\begin{aligned}
C(G^-_{233}, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = & -\frac{ie}{2\sqrt{2}M_W s_W^2} \left\{ \text{CKM}_{j1,j2}^* s_W \left[\frac{1}{s_{2\beta}} \left(2\delta\text{CKM}_{j1,j2}^* s_W - \text{CKM}_{j1,j2}^* (2\delta s_W - s_W (2\delta Z_e + \delta Z_{G-G^-})) \right) \left\{ \begin{aligned} & m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} (2c_\beta^2 \mu - A_{j1,j1}^{u*} s_{2\beta}) + \\ & U_{s1,1}^{\tilde{u},j1*} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (A_{j2,j2}^d s_{2\beta} - 2\mu^* s_\beta^2) + s_{2\beta} U_{s2,1}^{\tilde{d},j2} (m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta} M_W^2)) \end{aligned} \right\} + \right. \right. \\
& \left. \left. \frac{1}{s_\beta} \left\{ \frac{1}{c_\beta} \left\{ \begin{aligned} & \delta Z_{1,s1}^{\tilde{u},j1} \left\{ c_\beta m_{u_{j1}} U_{1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} (c_\beta \mu - A_{j1,j1}^{u*} s_\beta) + \right. \right. \\ & s_\beta U_{1,1}^{\tilde{u},j1*} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (A_{j2,j2}^d c_\beta - \mu^* s_\beta) + c_\beta U_{s2,1}^{\tilde{d},j2} (m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta} M_W^2)) \end{aligned} \right\} + \\ & \delta Z_{2,s1}^{\tilde{u},j1} \left\{ c_\beta m_{u_{j1}} U_{2,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} (c_\beta \mu - A_{j1,j1}^{u*} s_\beta) + \right. \\ & s_\beta U_{2,1}^{\tilde{u},j1*} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (A_{j2,j2}^d c_\beta - \mu^* s_\beta) + c_\beta U_{s2,1}^{\tilde{d},j2} (m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta} M_W^2)) \end{aligned} \right\} - \\ & \left. \frac{\delta M_W^2}{M_W^2} \left\{ c_\beta m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} (c_\beta \mu - A_{j1,j1}^{u*} s_\beta) + \right. \right. \\ & \left. \left. s_\beta U_{s1,1}^{\tilde{u},j1*} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (A_{j2,j2}^d c_\beta - \mu^* s_\beta) + c_\beta U_{s2,1}^{\tilde{d},j2} (m_{d_{j2}}^2 - m_{u_{j1}}^2 + c_{2\beta} M_W^2)) \right\} \right\} - \right. \\ & \left. 2U_{s2,1}^{\tilde{d},j2} \left\{ \frac{2\delta m_{j1}^u m_{u_{j1}} s_\beta U_{s1,1}^{\tilde{u},j1*} -}{U_{s1,2}^{\tilde{u},j1*} (m_{u_{j1}} (c_\beta \delta\mu - \delta A_{j1,j1}^{u*} s_\beta) + \delta m_{j1}^u (c_\beta \mu - A_{j1,j1}^{u*} s_\beta))} \right\} \right. \\ & \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ \frac{m_{u_{j1}} U_{1,1}^{\tilde{d},j2} U_{s1,2}^{\tilde{u},j1*}}{s_\beta} (c_\beta \mu - A_{j1,j1}^{u*} s_\beta) + \right. \\ & \left. U_{s1,1}^{\tilde{u},j1*} \left(\frac{m_{d_{j2}} U_{1,2}^{\tilde{d},j2}}{c_\beta} (A_{j2,j2}^d c_\beta - \mu^* s_\beta) + U_{1,1}^{\tilde{d},j2} (m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta} M_W^2) \right) \right\} + \\ & \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left\{ \frac{m_{u_{j1}} U_{2,1}^{\tilde{d},j2} U_{s1,2}^{\tilde{u},j1*}}{s_\beta} (c_\beta \mu - A_{j1,j1}^{u*} s_\beta) + \right. \\ & \left. U_{s1,1}^{\tilde{u},j1*} \left(\frac{m_{d_{j2}} U_{2,2}^{\tilde{d},j2}}{c_\beta} (A_{j2,j2}^d c_\beta - \mu^* s_\beta) + U_{2,1}^{\tilde{d},j2} (m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta} M_W^2) \right) \right\} - \\ & \frac{2\delta c_\beta}{c_\beta^2} \left\{ c_\beta m_{d_{j2}} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{d},j2} + \right. \\ & \left. U_{s1,1}^{\tilde{u},j1*} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (A_{j2,j2}^d c_\beta - \mu^* s_\beta) + c_\beta U_{s2,1}^{\tilde{d},j2} (m_{d_{j2}}^2 + c_\beta^2 M_W^2)) \right\} - \\ & \frac{\delta Z_{H-G^-}}{s_{2\beta}} \left\{ m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} (2m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} + U_{s2,1}^{\tilde{d},j2} (2A_{j1,j1}^{u*} c_\beta^2 + \mu s_{2\beta})) + \right. \\ & \left. U_{s1,1}^{\tilde{u},j1*} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (\mu^* s_{2\beta} + 2A_{j2,j2}^d s_\beta^2) - U_{s2,1}^{\tilde{d},j2} (M_W^2 s_{2\beta}^2 - 2(c_\beta^2 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^2))) \right\} + \\ & \frac{2U_{s1,1}^{\tilde{u},j1*}}{c_\beta} (m_{d_{j2}} U_{s2,2}^{\tilde{d},j2} (c_\beta \delta A_{j2,j2}^d - \delta\mu^* s_\beta) + \delta m_{j2}^d (2c_\beta m_{d_{j2}} U_{s2,1}^{\tilde{d},j2} + U_{s2,2}^{\tilde{d},j2} (A_{j2,j2}^d c_\beta - \mu^* s_\beta))) + \\ & \left. \frac{2\delta s_\beta}{s_\beta^2} (s_\beta U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} (m_{u_{j1}}^2 + M_W^2 s_\beta^2) + m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} (m_{d_{j2}} s_\beta U_{s2,2}^{\tilde{d},j2} - U_{s2,1}^{\tilde{d},j2} (c_\beta \mu - A_{j1,j1}^{u*} s_\beta))) \right\} + \end{aligned}$$

[SSSS] 2 Higgs – 2 Sleptons

$$C(h^0, h^0, \tilde{\nu}_{j2}, \tilde{\nu}_{j1}^\dagger) = \frac{ie^2 \delta_{j1,j2}}{8c_W^4 s_W^3} \left(c_W^2 s_W (2\delta Z_{hH} s_{2\alpha} + c_{2\alpha} (\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 2\delta Z_{hh} + \delta Z_{1,1}^{\tilde{\nu},j2})) + 4c_{2\alpha} (\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W)) \right)$$

$$C(h^0, h^0, \tilde{e}_{j2}^{s2}, \tilde{e}_{j1}^{s1, \dagger}) = -\frac{i e^2 \delta_{j1, j2}}{8 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e}, j1*} \left\{ \begin{array}{l} c_\beta c_W^2 M_W^2 s_W \left(2 c_W^2 m_{e1}^2 s_\alpha^2 - c_{2\alpha} c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e}, j1} U_{1,1}^{\tilde{e}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{e}, j1} U_{2,1}^{\tilde{e}, j1} \right) + \\ 2 U_{s1,1}^{\tilde{e}, j1} \left\{ \begin{array}{l} c_W^4 m_{e1} \left\{ \begin{array}{l} 4 c_\beta \delta m_{j1}^e M_W^2 s_\alpha^2 s_W - \\ 4 \delta c_\beta M_W^2 s_\alpha^2 s_W + \\ 4 \delta s_W M_W^2 s_\alpha^2 + \\ c_\beta \left\{ \begin{array}{l} 2 s_\alpha^2 (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{hh})) + \\ \delta Z_{hH} M_W^2 s_{2\alpha} \end{array} \right\} \right\} \right\} - \\ c_\beta^3 M_W^4 \left\{ \begin{array}{l} c_{2\alpha} (2 \delta s_W s_W^2 (1 - 2 c_W^2) + c_W^2 (2 \delta s_W + s_W (1 - 2 c_W^2) (2 \delta Z_e + \delta Z_{hh}))) + \\ c_W^2 \delta Z_{hH} s_{2\alpha} s_W (1 - 2 c_W^2) \end{array} \right\} \end{array} \right\} \\ 2 U_{s2,2}^{\tilde{e}, j1*} \left\{ \begin{array}{l} c_\beta c_W^2 M_W^2 s_W \left(c_W^2 m_{e1}^2 s_\alpha^2 + c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e}, j1} U_{1,2}^{\tilde{e}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{e}, j1} U_{2,2}^{\tilde{e}, j1} \right) + \\ U_{s1,2}^{\tilde{e}, j1} \left\{ \begin{array}{l} 2 c_\beta^3 M_W^4 s_W^3 (c_W^2 \delta Z_{hH} s_{2\alpha} + c_{2\alpha} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{hh}))) + \\ c_W^4 m_{e1} \left\{ \begin{array}{l} 4 c_\beta \delta m_{j1}^e M_W^2 s_\alpha^2 s_W - \\ 4 \delta c_\beta M_W^2 s_\alpha^2 s_W + \\ 4 \delta s_W M_W^2 s_\alpha^2 + \\ c_\beta \left\{ \begin{array}{l} 2 s_\alpha^2 (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{hh})) + \\ \delta Z_{hH} M_W^2 s_{2\alpha} \end{array} \right\} \right\} \right\} + \\ c_\beta c_W^2 M_W^2 s_W \left\{ \begin{array}{l} U_{s1,1}^{\tilde{e}, j1} \left(2 c_W^2 m_{e1}^2 s_\alpha^2 - c_{2\alpha} c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{e}, j2} U_{1,1}^{\tilde{e}, j1*} + \delta Z_{2,s2}^{\tilde{e}, j2} U_{2,1}^{\tilde{e}, j1*} \right) + \\ 2 U_{s1,2}^{\tilde{e}, j1} \left(c_W^2 m_{e1}^2 s_\alpha^2 + c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e}, j2} U_{1,2}^{\tilde{e}, j1*} + \delta Z_{2,s2}^{\tilde{e}, j2} U_{2,2}^{\tilde{e}, j1*} \right) \end{array} \right\} \end{array} \right\} \end{array} \right\} + \end{array} \right\}$$

$$C(H^0, H^0, \tilde{\nu}_{j2}, \tilde{\nu}_{j1}^\dagger) = \frac{i e^2 \delta_{j1, j2}}{8 c_W^4 s_W^3} \left(c_W^2 s_W \left(2 \delta Z_{hH} s_{2\alpha} - c_{2\alpha} \left(\delta \bar{Z}_{1,1}^{\tilde{\nu}, j1} + 2 \delta Z_{HH} + \delta Z_{1,1}^{\tilde{\nu}, j2} \right) \right) - 4 c_{2\alpha} (\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W)) \right)$$

$$C(H^0, H^0, \tilde{e}_{j2}^{s2}, \tilde{e}_{j1}^{s1, \dagger}) = -\frac{i e^2 \delta_{j1,j2}}{8 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(2 c_\alpha^2 c_W^2 m_{e1}^2 + c_{2\alpha} c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1} \right) + \\ & 2 U_{s1,1}^{\tilde{e},j1} \left\{ \begin{aligned} & c_W^4 m_{e1} \left\{ \begin{aligned} & 4 c_\alpha^2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ & c_\beta \delta Z_{hH} M_W^2 s_{2\alpha} s_W + \\ & 2 c_\alpha^2 (2 \delta c_\beta M_W^2 s_W + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{HH}))) \end{aligned} \right\} \left\{ \right\} - \left\{ \right\} \\ & c_\beta^3 M_W^4 \left\{ \begin{aligned} & c_W^2 \delta Z_{hH} s_{2\alpha} s_W (1 - 2 c_W^2) - \\ & c_{2\alpha} (2 \delta s_W s_W^2 (1 - 2 c_W^2) + c_W^2 (2 \delta s_W + s_W (1 - 2 c_W^2) (2 \delta Z_e + \delta Z_{HH}))) \end{aligned} \right\} \left\{ \right\} \end{aligned} \right\} \\ & 2 U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(c_\alpha^2 c_W^2 m_{e1}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1} \right) + \\ & 2 c_\beta^3 M_W^4 s_W^3 (c_W^2 \delta Z_{hH} s_{2\alpha} - c_{2\alpha} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{HH}))) + \\ & U_{s1,2}^{\tilde{e},j1} \left\{ \begin{aligned} & 4 c_\alpha^2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ & c_W^4 m_{e1} \left\{ \begin{aligned} & c_\beta \delta Z_{hH} M_W^2 s_{2\alpha} s_W + \\ & 2 c_\alpha^2 (2 \delta c_\beta M_W^2 s_W + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{HH}))) \end{aligned} \right\} \left\{ \right\} \end{aligned} \right\} \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{e},j1} \left(2 c_\alpha^2 c_W^2 m_{e1}^2 + c_{2\alpha} c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{e},j1} \left(c_\alpha^2 c_W^2 m_{e1}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) \end{aligned} \right\} \left\{ \right\} \end{aligned} \right\} + \end{aligned} \right\} \left\{ \right\} + \end{aligned} \right\}$$

$$C(A^0, A^0, \tilde{\nu}_{j2}, \tilde{\nu}_{j1}^\dagger) = \frac{i e^2 \delta_{j1,j2}}{8 c_W^4 s_W^3} \left(c_W^2 s_W \left(2 \delta Z_{AG} s_{2\beta} + c_{2\beta} \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 2 \delta Z_{AA} + \delta Z_{1,1}^{\tilde{\nu},j2} \right) \right) + 4 c_{2\beta} (\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W)) \right)$$

$$C(G^0, G^0, \tilde{\nu}_{j2}, \tilde{\nu}_{j1}^\dagger) = \frac{i e^2 \delta_{j1,j2}}{8 c_W^4 s_W^3} \left(c_W^2 s_W \left(2 \delta Z_{AG} s_{2\beta} - c_{2\beta} \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 2 \delta Z_{GG} + \delta Z_{1,1}^{\tilde{\nu},j2} \right) \right) - 4 c_{2\beta} (\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W)) \right)$$

$$C(A^0, G^0, \tilde{\nu}_{j2}, \tilde{\nu}_{j1}^\dagger) = \frac{i e^2 \delta_{j1,j2} s_{2\beta}}{8 c_W^4 s_W^3} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 (\delta s_W - \delta Z_e s_W) - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{1,1}^{\tilde{\nu},j2} \right) \right) \right)$$

$$\begin{aligned}
C(A^0, A^0, \tilde{e}_{j2}^{s2}, \tilde{e}_{j1}^{s1,\dagger}) = & -\frac{i e^2 \delta_{j1,j2}}{8 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_W \left(c_W^2 m_{e1}^2 s_{2\beta} s_\beta - c_{2\beta} c_\beta^3 M_W^2 (1 - 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1} \right) + \\ & 2 U_{s1,1}^{\tilde{e},j1} \left\{ \begin{aligned} & \delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ & 2 c_W^4 m_{e1} s_\beta \left\{ \begin{aligned} & m_{e1} \left\{ \frac{s_{2\beta}}{2} (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{AA}))) + \right\} \right\} - \end{aligned} \right\} \\ & c_\beta^3 M_W^4 \left\{ \begin{aligned} & c_{2\beta} (2 \delta s_W s_W^2 (1 - 2 c_W^2) + c_W^2 (2 \delta s_W + s_W (1 - 2 c_W^2) (2 \delta Z_e + \delta Z_{AA}))) + \end{aligned} \right\} \end{aligned} \right\} \\ & 2 U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(c_W^2 m_{e1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1} \right) + \\ & c_\beta^3 M_W^4 s_W^3 \left(c_W^2 \delta Z_{AG} s_{2\beta} + c_{2\beta} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{AA})) \right) + \\ & 2 U_{s1,2}^{\tilde{e},j1} \left\{ \begin{aligned} & \delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ & c_W^4 m_{e1} s_\beta \left\{ \begin{aligned} & m_{e1} \left\{ \frac{s_{2\beta}}{2} (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{AA}))) + \right\} \right\} \end{aligned} \right\} \\ & M_W^2 s_W \left(c_\beta^2 \delta Z_{AG} + 2 \delta c_\beta s_\beta \right) \end{aligned} \right\} \end{aligned} \right\} \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{e},j1} \left(2 c_W^2 m_{e1}^2 s_\beta^2 - c_{2\beta} c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{e},j1} \left(c_W^2 m_{e1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} + \end{aligned}
\end{aligned}$$

$$\begin{aligned}
C(G^0, G^0, \tilde{e}_{j2}^{s2}, \tilde{e}_{j1}^{s1,\dagger}) = & -\frac{i e^2 \delta_{j1,j2}}{8 c_\beta c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(2 c_W^2 m_{e1}^2 + c_{2\beta} M_W^2 (1 - 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1} \right) - \\ & 2 c_W^4 m_{e1}^2 \left(M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta) + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{GG}))) \right) - \end{aligned} \right\} \\ & 2 U_{s1,1}^{\tilde{e},j1} \left\{ \begin{aligned} & 4 c_W^4 \delta m_{j1}^e m_{e1} M_W^2 s_W - \\ & c_\beta \left\{ \begin{aligned} & c_W^2 \delta Z_{AG} s_{2\beta} s_W (1 - 2 c_W^2) - \\ & M_W^4 \left\{ \begin{aligned} & c_{2\beta} \left\{ \begin{aligned} & 2 \delta s_W s_W^2 (1 - 2 c_W^2) + \\ & c_W^2 (2 \delta s_W + s_W (1 - 2 c_W^2) (2 \delta Z_e + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \\ & 2 U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(c_W^2 m_{e1}^2 - c_{2\beta} M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1} \right) - \\ & c_W^4 m_{e1}^2 \left(M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta) + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{GG}))) \right) - \\ & 2 U_{s1,2}^{\tilde{e},j1} \left\{ \begin{aligned} & M_W^4 s_W^3 \left(c_W^2 \delta Z_{AG} s_{2\beta} - c_{2\beta} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{GG})) \right) + \\ & 2 c_W^4 \delta m_{j1}^e m_{e1} M_W^2 s_W \end{aligned} \right\} \end{aligned} \right\} \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{e},j1} \left(2 c_W^2 m_{e1}^2 + c_{2\beta} M_W^2 (1 - 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{e},j1} \left(c_W^2 m_{e1}^2 - c_{2\beta} M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} + \end{aligned}
\end{aligned}$$

$$C(A^0, G^0, \tilde{e}_{j2}^{s2}, \tilde{e}_{j1}^{s1,\dagger}) = \frac{i e^2 \delta_{j1,j2}}{8 c_\beta^2 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\beta} s_W \left(c_W^2 m_{e1}^2 + c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1} \right) + \\ & c_\beta^2 M_W^4 s_{2\beta} \left(c_W^2 s_W (1 - 2 c_W^2) (\delta Z_{AA} + \delta Z_{GG}) + 4 (\delta s_W s_W^2 + c_W^2 (1 - 2 s_W^2) (\delta s_W - \delta Z_e s_W)) \right) + \\ & c_W^4 m_{e1} \left\{ \begin{aligned} & 4 \delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ & 4 \delta s_W M_W^2 s_{2\beta} + \\ & m_{e1} \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\beta} + \\ & s_W \left\{ \begin{aligned} & M_W^2 \left\{ \begin{aligned} & 2 \delta Z_{AG} + 8 \delta c_\beta s_\beta - \\ & s_{2\beta} (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & U_{s2,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\beta} s_W \left(c_W^2 m_{e1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1} \right) - \\ & 2 c_\beta^2 M_W^4 s_{2\beta} s_W^3 (4 \delta s_W s_W + c_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) - \\ & c_W^4 m_{e1} \left\{ \begin{aligned} & 4 \delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ & s_{2\beta} (4 \delta s_W M_W^2 + 2 s_W (\delta M_W^2 - 2 \delta Z_e M_W^2)) + \\ & m_{e1} \left\{ \begin{aligned} & M_W^2 s_W (2 \delta Z_{AG} + 8 \delta c_\beta s_\beta - s_{2\beta} (\delta Z_{AA} + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 M_W^2 s_{2\beta} s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{e},j1} \left(c_W^2 m_{e1}^2 + c_\beta^2 M_W^2 (1 - 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) + \\ & U_{s1,2}^{\tilde{e},j1} \left(c_W^2 m_{e1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ C(h^0, H^0, \tilde{\nu}_{j2}, \tilde{\nu}_{j1}^\dagger) = \frac{i e^2 \delta_{j1,j2} s_{2\alpha}}{8 c_W^4 s_W^3} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 (\delta s_W - \delta Z_e s_W) - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{1,1}^{\tilde{\nu},j2} \right) \right) \right)$$

$$\begin{aligned}
C_{317}(h^0, G^-, \tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2, \dagger}) &= \frac{i e^2 \delta_{j1, j2}}{4 \sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e}, j1} \left[c_\beta M_W^2 s_W \left(m_{e_{j1}}^2 s_\alpha - c_\beta M_W^2 s_{\alpha+\beta} \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e}, j2} U_{1,1}^{\tilde{e}, j1} + \delta \bar{Z}_{2,s2}^{\tilde{e}, j2} U_{2,1}^{\tilde{e}, j1} \right) + \right. \right. \\
&\quad \left. \left. c_\beta \left[\frac{M_W^4}{2} \left\{ c_\beta^2 \left\{ \begin{aligned} &2 m_{e_{j1}} s_\alpha \left(2 \delta m_{j1}^e M_W^2 s_W - m_{e_{j1}} \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) + \\ &8 \delta s_W s_\alpha + \\ &2 s_W \left(c_\alpha \left(\delta Z_{hH} - \delta Z_{H^- G^-} \right) - s_\alpha \left(4 \delta Z_e + \delta Z_{hh} + \delta Z_{G^- G^-} \right) \right) \right\} - \right\} \right] + \right. \\
&\quad \left. \left. s_{2\beta} \left\{ \begin{aligned} &s_\alpha s_W \left(\delta Z_{hH} - \delta Z_{H^- G^-} \right) - \\ &c_\alpha \left(4 \delta s_W - s_W \left(4 \delta Z_e + \delta Z_{hh} + \delta Z_{G^- G^-} \right) \right) \right\} \right] \right\} \\
&\quad \left. M_W^2 s_W \left\{ \begin{aligned} &c_\beta \delta Z_{1,1}^{\tilde{\nu}, j1} \left(m_{e_{j1}}^2 s_\alpha - c_\beta M_W^2 s_{\alpha+\beta} \right) - \\ &m_{e_{j1}}^2 \left\{ \begin{aligned} &s_\alpha \left(4 \delta c_\beta + \delta Z_{H^- G^-} s_\beta \right) + \\ &c_\beta \left(c_\alpha \delta Z_{hH} - s_\alpha \left(4 \delta Z_e + \delta Z_{hh} + \delta Z_{G^- G^-} \right) \right) \right\} \right\} \right\} \right\} \\
C_{318}(h^0, H^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) &= -\frac{i e^2 \delta_{j1, j2}}{8 \sqrt{2} c_\beta^3 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e}, j1*} \left[M_W^2 s_W \left(2 c_{\alpha+\beta} c_\beta^3 M_W^2 + m_{e_{j1}}^2 s_{2\beta} s_\alpha \right) \left(\delta Z_{1,s2}^{\tilde{e}, j2} U_{1,1}^{\tilde{e}, j1*} + \delta Z_{2,s2}^{\tilde{e}, j2} U_{2,1}^{\tilde{e}, j1*} \right) - \right. \right. \\
&\quad \left. \left. m_{e_{j1}}^2 M_W^2 s_\alpha s_W \left(2 c_\beta^2 \delta Z_{G^- H^-}^* + 8 \delta c_\beta s_\beta \right) - \right. \right. \\
&\quad \left. \left. m_{e_{j1}} s_{2\beta} \left\{ \begin{aligned} &4 \delta m_{j1}^e M_W^2 s_\alpha s_W - \\ &M_W^2 s_\alpha \left(4 \delta s_W - \delta \bar{Z}_{1,1}^{\tilde{\nu}, j1} s_W \right) + \\ &s_W \left(2 \delta M_W^2 s_\alpha + M_W^2 \left(c_\alpha \delta Z_{hH} - s_\alpha \left(\delta \bar{Z}_{H^- H^-} + 4 \delta Z_e + \delta Z_{hh} \right) \right) \right) \right\} \right\} - \right. \\
&\quad \left. \left. M_W^4 \left\{ \begin{aligned} &2 c_\beta^3 s_W \left(c_{\alpha+\beta} \delta \bar{Z}_{H^- H^-} + \delta Z_{G^- H^-}^* s_{\alpha+\beta} \right) + \\ &2 c_\beta^4 \left(\delta Z_{hH} s_\alpha s_W - c_\alpha \left(4 \delta s_W - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu}, j1} + 4 \delta Z_e + \delta Z_{hh} \right) \right) \right) + \\ &c_\beta^2 s_{2\beta} \left(s_\alpha \left(4 \delta s_W - \delta \bar{Z}_{1,1}^{\tilde{\nu}, j1} s_W \right) + s_W \left(c_\alpha \delta Z_{hH} - s_\alpha \left(4 \delta Z_e + \delta Z_{hh} \right) \right) \right) \right\} \right\} \right\} \\
C_{319}(h^0, G^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) &= \frac{i e^2 \delta_{j1, j2}}{8 \sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e}, j1*} \left[2 c_\beta M_W^2 s_W \left(m_{e_{j1}}^2 s_\alpha - c_\beta M_W^2 s_{\alpha+\beta} \right) \left(\delta Z_{1,s2}^{\tilde{e}, j2} U_{1,1}^{\tilde{e}, j1*} + \delta Z_{2,s2}^{\tilde{e}, j2} U_{2,1}^{\tilde{e}, j1*} \right) - \right. \right. \\
&\quad \left. \left. m_{e_{j1}}^2 M_W^2 s_\alpha s_W \left(8 \delta c_\beta + 2 \delta Z_{G^- H^-} s_\beta \right) - \right. \right. \\
&\quad \left. \left. 2 c_\beta m_{e_{j1}} \left\{ \begin{aligned} &4 \delta m_{j1}^e M_W^2 s_\alpha s_W - \\ &M_W^2 s_\alpha \left(4 \delta s_W - \delta \bar{Z}_{1,1}^{\tilde{\nu}, j1} s_W \right) + \\ &s_W \left(2 \delta M_W^2 s_\alpha + M_W^2 \left(c_\alpha \delta Z_{hH} - s_\alpha \left(4 \delta Z_e + \delta Z_{hh} + \delta Z_{G^- G^-} \right) \right) \right) \right\} \right\} + \right. \\
&\quad \left. \left. M_W^4 \left\{ \begin{aligned} &c_\beta s_{2\beta} \left(\delta Z_{hH} s_\alpha s_W - c_\alpha \left(4 \delta s_W - s_W \left(4 \delta Z_e + \delta Z_{hh} \right) \right) \right) - \\ &2 c_\beta^3 \left(4 \delta s_W s_\alpha + s_W \left(c_\alpha \delta Z_{hH} - s_\alpha \left(4 \delta Z_e + \delta Z_{hh} \right) \right) \right) + \\ &2 c_\beta^2 s_W \left(c_{\alpha+\beta} \delta Z_{G^- H^-} + s_{\alpha+\beta} \left(\delta \bar{Z}_{1,1}^{\tilde{\nu}, j1} + \delta Z_{G^- G^-} \right) \right) \right\} \right\} \right\} \\
\end{aligned}
\end{aligned}$$

$$C_{320}(A^0, H^-, \tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}) = \frac{e^2 \delta_{j1,j2}}{4\sqrt{2} c_\beta^3 M_W^4 s_W^3} \left\{ \frac{U_{s2,1}^{\tilde{e},j1}}{4} \left\{ c_\beta M_W^2 s_W \left(c_{2\beta} c_\beta^2 M_W^2 + m_{e_1}^2 s_\beta^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \right. \right. \\ \left. \left. \begin{aligned} & m_{e_1}^2 M_W^2 s_W \left(16 \delta c_\beta s_\beta^2 + 2 c_\beta s_{2\beta} (\delta Z_{AG} + \delta Z_{G^-H^-}) \right) - \\ & 2 m_{e_1} s_{2\beta} s_\beta \left\{ \begin{aligned} & 4 \delta m_{j1}^e M_W^2 s_W - \\ & m_{e_1} \left(s_W (2 \delta M_W^2 - M_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{H^-H^-})) + M_W^2 (4 \delta s_W - \delta Z_{1,1}^{\tilde{\nu},j1} s_W) \right) \end{aligned} \right\} + \end{aligned} \right\} \right\}$$

$$C_{321}(G^0, G^-, \tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}) = \frac{e^2 \delta_{j1,j2}}{4\sqrt{2} c_\beta M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1} \left\{ c_\beta M_W^2 s_W \left(m_{e_1}^2 - c_{2\beta} M_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) + \right. \right. \\ \left. \left. \begin{aligned} & 2 c_\beta m_{e_1} \left(2 \delta m_{j1}^e M_W^2 s_W - m_{e_1} (2 \delta s_W M_W^2 + \delta M_W^2 s_W) \right) + \\ & \frac{M_W^4}{2} \left\{ \begin{aligned} & c_\beta^3 (8 \delta s_W - 2 s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-})) - \\ & s_{2\beta} (s_\beta (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-})) - 2 c_\beta s_W (\delta Z_{AG} + \delta Z_{H^-G^-})) \end{aligned} \right\} - \end{aligned} \right\} \right\}$$

$$C_{322}(A^0, G^-, \tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}) = -\frac{e^2 \delta_{j1,j2}}{4\sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1} \left\{ \frac{M_W^2 s_{2\beta} s_W}{2} \left(m_{e_1}^2 - 2 c_\beta^2 M_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \right. \right. \\ \left. \left. \begin{aligned} & 2 m_{e_1} M_W^2 s_{2\beta} \left(\delta s_W m_{e_1} - \delta m_{j1}^e s_W \right) - \\ & \frac{M_W^4}{4} \left\{ \begin{aligned} & s_W \left(4 c_\beta^4 - s_{2\beta}^2 \right) (\delta Z_{AG} - \delta Z_{H^-G^-}) + \\ & 4 c_\beta^2 s_{2\beta} (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-})) \end{aligned} \right\} - \end{aligned} \right\} \right\}$$

$$C(G^0, H^-, \tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2, \dagger}) = -\frac{e^2 \delta_{j1,j2}}{4\sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1} \left\{ \frac{M_W^2 s_{2\beta} s_W}{2} \left(m_{e1}^2 - 2 c_\beta^2 M_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) + \right. \right. \\ \left. \left. m_{e1} s_{2\beta} \left(2 \delta m_{j1}^e M_W^2 s_W - m_{e1} (2 \delta s_W M_W^2 + \delta M_W^2 s_W) \right) + \frac{M_W^4}{4} \left\{ 4 c_\beta^2 s_{2\beta} (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{H-H-})) - \right. \right. \right. \\ \left. \left. s_W \left(4 c_\beta^4 - s_{2\beta}^2 \right) (\delta Z_{AG} - \delta Z_{G-H-}) \right\} - \frac{M_W^2 s_W}{2} \left\{ m_{e1}^2 \left(2 c_\beta^2 \delta Z_{G-H-} + 8 \delta c_\beta s_\beta + 2 \delta Z_{AG} s_\beta^2 - s_{2\beta} (4 \delta Z_e + \delta Z_{GG} + \delta Z_{H-H-}) \right) - \right. \right. \\ \left. \left. \delta Z_{1,1}^{\tilde{\nu},j1} s_{2\beta} \left(m_{e1}^2 - 2 c_\beta^2 M_W^2 \right) \right\} \right\} \right\}$$

$$C(A^0, H^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = -\frac{e^2 \delta_{j1,j2}}{16\sqrt{2} c_\beta^3 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1*} \left\{ 2 M_W^2 s_W \left(2 c_{2\beta} c_\beta^3 M_W^2 + m_{e1}^2 s_{2\beta} s_\beta \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) - \right. \right. \\ \left. \left. m_{e1}^2 M_W^2 s_W \left(16 \delta c_\beta s_\beta^2 + 2 c_\beta s_{2\beta} (\delta Z_{AG} + \delta Z_{G-H-}^*) \right) - 2 m_{e1} s_{2\beta} s_\beta \left\{ 4 \delta m_{j1}^e M_W^2 s_W - m_{e1} \left(s_W (2 \delta M_W^2 - M_W^2 (\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{AA})) + M_W^2 (4 \delta s_W - \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} s_W) \right) \right\} + \right. \right. \\ \left. \left. M_W^4 \left\{ \left(4 c_\beta^5 - c_\beta s_{2\beta}^2 \right) (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA})) - 4 c_\beta^3 s_W \left(c_{2\beta} (\delta \bar{Z}_{H-H-} + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1}) + s_{2\beta} (\delta Z_{AG} + \delta Z_{G-H-}^*) \right) \right\} \right\} \right\} + \left\{ \right\}$$

$$C(G^0, G^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = -\frac{e^2 \delta_{j1,j2}}{4\sqrt{2} c_\beta M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1*} \left\{ c_\beta M_W^2 s_W \left(m_{e1}^2 - c_{2\beta} M_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) + \right. \right. \\ \left. \left. 2 c_\beta m_{e1} \left(2 \delta m_{j1}^e M_W^2 s_W - m_{e1} (2 \delta s_W M_W^2 + \delta M_W^2 s_W) \right) - \frac{M_W^4}{2} \left\{ s_{2\beta} s_\beta (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG})) - c_\beta^3 (8 \delta s_W - 2 s_W (4 \delta Z_e + \delta Z_{GG})) + \right. \right. \right. \\ \left. \left. 2 c_\beta s_W (c_{2\beta} \delta Z_{G-G-} - s_{2\beta} (\delta Z_{AG} + \delta Z_{G-H-})) \right\} - M_W^2 s_W \left\{ m_{e1}^2 (4 \delta c_\beta + s_\beta (\delta Z_{AG} + \delta Z_{G-H-})) - c_\beta (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G-G-}) - \right. \right. \\ \left. \left. c_\beta \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} \left(m_{e1}^2 - c_{2\beta} M_W^2 \right) \right\} \right\} \right\}$$

$$C(A^0, G^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = \frac{e^2 \delta_{j1,j2}}{4 \sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1*} \left\{ \frac{M_W^2 s_{2\beta} s_W}{2} \left(m_{e_1}^2 - 2 c_\beta^2 M_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) - \right. \right. \\ \left. \left. \begin{aligned} & 2 m_{e_1} M_W^2 s_{2\beta} \left(\delta s_W m_{e_1} - \delta m_{j1}^e s_W \right) - \\ & \frac{M_W^4}{4} \left\{ \delta Z_{AG} s_W \left(4 c_\beta^4 - s_{2\beta}^2 \right) + \right. \\ & \left. 4 c_\beta^2 \left(4 \delta s_W s_{2\beta} - s_W \left(c_{2\beta} \delta Z_{G^-H^-} + s_{2\beta} \left(4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-} \right) \right) \right\} - \end{aligned} \right\} - \right. \\ \left. s_W \left\{ \frac{\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} M_W^2 s_{2\beta}}{2} \left(m_{e_1}^2 - 2 c_\beta^2 M_W^2 \right) - \right. \right. \\ \left. \left. m_{e_1}^2 \left\{ \frac{\delta M_W^2 s_{2\beta}}{2} + \right. \right. \right. \\ \left. \left. \left. \frac{M_W^2}{2} \left\{ 8 \delta c_\beta s_\beta + 2 \left(c_\beta^2 \delta Z_{AG} + \delta Z_{G^-H^-} s_\beta^2 \right) - \right\} \right\} \right\} \right\} \right\} - \left. \right\}$$

$$C(G^0, H^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = \frac{e^2 \delta_{j1,j2}}{16 \sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1*} \left\{ 2 M_W^2 s_{2\beta} s_W \left(m_{e_1}^2 - 2 c_\beta^2 M_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) - \right. \right. \\ \left. \left. \begin{aligned} & M_W^4 \left(\delta Z_{AG} s_W \left(4 c_\beta^4 - s_{2\beta}^2 \right) - 4 c_\beta^2 s_{2\beta} \left(4 \delta s_W - s_W \left(\delta \bar{Z}_{H^-H^-} + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 4 \delta Z_e + \delta Z_{GG} \right) \right) \right) + \\ & M_W^2 s_W \left(4 c_\beta^2 \delta Z_{G^-H^-}^* \left(m_{e_1}^2 - c_{2\beta} M_W^2 \right) + m_{e_1}^2 \left(16 \delta c_\beta s_\beta + 4 \delta Z_{AG} s_\beta^2 \right) \right) - \\ & 2 m_{e_1} s_{2\beta} \left\{ 4 \delta m_{j1}^e M_W^2 s_W - \right. \\ & \left. m_{e_1} \left(s_W \left(2 \delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{H^-H^-} + 4 \delta Z_e + \delta Z_{GG} \right) \right) + M_W^2 \left(4 \delta s_W - \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} s_W \right) \right) \right\} \end{aligned} \right\} \right\} - \left. \right\}$$

$$C(H^0, H^-, \tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}) = -\frac{i e^2 \delta_{j1,j2}}{4 \sqrt{2} c_\beta^3 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1} \left\{ c_\beta M_W^2 s_W \left(c_\beta^2 M_W^2 s_{\alpha+\beta} - c_\alpha m_{e_1}^2 s_\beta \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \right. \right. \\ \left. \left. \begin{aligned} & c_\alpha m_{e_1} \left(2 \delta m_{j1}^e M_W^2 s_{2\beta} s_W - m_{e_1} \left(2 \delta s_W M_W^2 s_{2\beta} + s_W \left(4 \delta c_\beta M_W^2 s_\beta + s_{2\beta} \left(\delta M_W^2 - 2 \delta Z_e M_W^2 \right) \right) \right) \right) + \\ & c_\beta^3 M_W^4 \left\{ 4 s_{\alpha+\beta} \left(\delta s_W - \delta Z_e s_W \right) - \right. \\ & s_W \left\{ c_\alpha \left(c_\beta \left(\delta Z_{hH} - \delta Z_{G^-H^-} \right) + s_\beta \left(\delta Z_{HH} + \delta Z_{H^-H^-} \right) \right) - \right. \\ & \left. s_\alpha \left(s_\beta \left(\delta Z_{hH} - \delta Z_{G^-H^-} \right) - c_\beta \left(\delta Z_{HH} + \delta Z_{H^-H^-} \right) \right) \right\} \right\} - \\ & \frac{M_W^2 s_W}{2} \left\{ m_{e_1}^2 \left(2 c_\alpha c_\beta^2 \delta Z_{G^-H^-} + s_{2\beta} \left(\delta Z_{hH} s_\alpha - c_\alpha \left(\delta Z_{HH} + \delta Z_{H^-H^-} \right) \right) \right) - \right. \\ & \left. \delta Z_{1,1}^{\tilde{\nu},j1} \left(c_\alpha m_{e_1}^2 s_{2\beta} - 2 c_\beta^3 M_W^2 s_{\alpha+\beta} \right) \right\} \right\} \right\} - \left. \right\}$$

$$C(H^0, G^-, \tilde{\nu}_{j1}^{s2}, \tilde{e}_{j2}^{s2, \dagger}) = -\frac{i e^2 \delta_{j1,j2}}{4 \sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1} \left[c_\beta M_W^2 s_W \left(c_\alpha m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) + \right. \right. \\ \left. \left. c_\alpha \left(4 c_\beta \delta m_{j1}^e m_{e1} M_W^2 s_W - 2 m_{e1}^2 \left(2 \delta c_\beta M_W^2 s_W + c_\beta \left(\delta M_W^2 s_W + M_W^2 (2 \delta s_W - 2 \delta Z_e s_W) \right) \right) \right) - \right. \right. \\ \left. \left. \frac{c_\beta M_W^4}{2} \left\{ s_{2\beta} (4 \delta s_W s_\alpha - s_W (c_\alpha (\delta Z_{hH} + \delta Z_{H^-G^-}) + s_\alpha (4 \delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-})) \right) - \right. \right. \\ \left. \left. 2 c_\beta^2 (c_\alpha (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-})) + s_\alpha s_W (\delta Z_{hH} + \delta Z_{H^-G^-})) \right\} - \right. \\ \left. \left. M_W^2 s_W \left\{ m_{e1}^2 (c_\alpha \delta Z_{H^-G^-} s_\beta + c_\beta (\delta Z_{hH} s_\alpha - c_\alpha (\delta Z_{HH} + \delta Z_{G^-G^-})) \right) - \right. \right. \\ \left. \left. c_\beta \delta Z_{1,1}^{\tilde{\nu},j1} \left(c_\alpha m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W^2 \right) \right\} \right] \right\}$$

$$C(H^0, H^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = \frac{i e^2 \delta_{j1,j2}}{8 \sqrt{2} c_\beta^3 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1*} \left[M_W^2 s_W \left(c_\alpha m_{e1}^2 s_{2\beta} - 2 c_\beta^3 M_W^2 s_{\alpha+\beta} \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) - \right. \right. \\ \left. \left. c_\alpha m_{e1}^2 M_W^2 s_W \left(2 c_\beta^2 \delta Z_{G^-H^-}^* + 8 \delta c_\beta s_\beta \right) - \right. \right. \\ \left. \left. m_{e1} s_{2\beta} \left\{ 4 c_\alpha \delta m_{j1}^e M_W^2 s_W + \right. \right. \right. \\ \left. \left. \left. m_{e1} \left\{ M_W^2 s_W \left(c_\alpha \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} - \delta Z_{hH} s_\alpha \right) - \right. \right. \right. \\ \left. \left. \left. c_\alpha (4 \delta s_W M_W^2 + s_W (2 \delta M_W^2 - M_W^2 (\delta \bar{Z}_{H^-H^-} + 4 \delta Z_e + \delta Z_{HH}))) \right\} \right\} - \right. \\ \left. \left. M_W^4 \left\{ 2 \left\{ c_\beta^2 s_{2\beta} (\delta Z_{hH} s_\alpha s_W + c_\alpha (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{HH}))) + \right. \right. \right. \\ \left. \left. \left. c_\beta^3 s_W (c_{\alpha+\beta} \delta Z_{G^-H^-}^* - s_{\alpha+\beta} (\delta \bar{Z}_{H^-H^-} + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1})) \right\} + \right. \right. \\ \left. \left. \left. c_\beta^4 (4 \delta s_W s_\alpha - s_W (c_\alpha \delta Z_{hH} + s_\alpha (4 \delta Z_e + \delta Z_{HH}))) \right\} \right\} \right] \right\}$$

$$C(H^0, G^+, \tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger) = -\frac{i e^2 \delta_{j1,j2}}{8 \sqrt{2} c_\beta^2 M_W^4 s_W^3} \left\{ U_{s2,1}^{\tilde{e},j1*} \left[2 c_\beta M_W^2 s_W \left(c_\alpha m_{e1}^2 - c_{\alpha+\beta} c_\beta M_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) - \right. \right. \\ \left. \left. c_\alpha m_{e1}^2 M_W^2 s_W (8 \delta c_\beta + 2 \delta Z_{G^-H^-} s_\beta) - \right. \right. \\ \left. \left. 2 c_\beta m_{e1} \left\{ 4 c_\alpha \delta m_{j1}^e M_W^2 s_W + \right. \right. \right. \\ \left. \left. \left. m_{e1} \left\{ M_W^2 s_W \left(c_\alpha \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} - \delta Z_{hH} s_\alpha \right) - \right. \right. \right. \\ \left. \left. \left. c_\alpha (4 \delta s_W M_W^2 + s_W (2 \delta M_W^2 - M_W^2 (4 \delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-}))) \right\} \right\} + \right. \\ \left. \left. M_W^4 \left\{ c_\beta s_{2\beta} (4 \delta s_W s_\alpha - s_W (c_\alpha \delta Z_{hH} + s_\alpha (4 \delta Z_e + \delta Z_{HH}))) - \right. \right. \right. \\ \left. \left. \left. 2 \left\{ c_\beta^3 (\delta Z_{hH} s_\alpha s_W + c_\alpha (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{HH}))) + \right. \right. \right. \\ \left. \left. \left. c_\beta^2 s_W (\delta Z_{G^-H^-} s_{\alpha+\beta} - c_{\alpha+\beta} (\delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + \delta Z_{G^-G^-})) \right\} \right\} \right] \right\}$$

$$\begin{aligned}
C(H^-, H^+, \tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2, \dagger}) = & \frac{i e^2 \delta_{j1, j2}}{8 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \right. \\
& c_\beta M_W^2 \left\{ \right. \\
& \quad M_W^2 U_{s1,1}^{\tilde{e}, j1*} \left\{ \right. \\
& \quad \quad U_{s2,1}^{\tilde{e}, j1} \left\{ \right. \\
& \quad \quad \quad c_{2\beta} c_\beta^2 c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e}, j2} U_{1,1}^{\tilde{e}, j1} + \delta \bar{Z}_{2,s2}^{\tilde{e}, j2} U_{2,1}^{\tilde{e}, j1} \right) + \\
& \quad \quad \quad \delta s_W \left(4 c_\beta^8 s_W^2 - 4 c_\beta^2 c_W^2 \left(1 - 2 c_W^2 s_\beta^2 + 2 c_{2\beta} s_\beta^4 s_W^2 \right) \right) + \\
& \quad \quad \quad c_W^2 \delta Z_{G-H-}^* s_{2\beta} + \\
& \quad \quad \quad c_{2\beta} \left(\delta s_W s_{2\beta}^2 s_W + c_W^2 \left(\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{H-H-} \right) \right) - \\
& \quad \quad \quad c_\beta^2 s_W \left\{ \right. \\
& \quad \quad \quad \quad 2 \delta s_W s_\beta^6 s_W - \\
& \quad \quad \quad \quad 2 \left\{ \right. \\
& \quad \quad \quad \quad \quad c_W^2 \left\{ \right. \\
& \quad \quad \quad \quad \quad \quad 4 c_\beta \delta c_\beta + \delta s_\beta \left(4 s_\beta - 8 s_\beta^3 \right) + \\
& \quad \quad \quad \quad \quad \quad \frac{s_{2\beta}}{2} \left(\delta Z_{G-H-} - 8 \delta c_\beta s_\beta + 2 \delta s_W s_{2\beta} s_W \left(1 + 2 s_\beta^2 \right) \right) \left. \right\} \left. \right\} \left. \right\} + \\
& \quad \quad c_W^2 s_W \left\{ \right. \\
& \quad \quad \quad c_{2\beta} c_\beta^2 M_W^2 U_{s2,1}^{\tilde{e}, j1} \left(\delta Z_{1,s1}^{\tilde{e}, j1} U_{1,1}^{\tilde{e}, j1*} + \delta Z_{2,s1}^{\tilde{e}, j1} U_{2,1}^{\tilde{e}, j1*} \right) - \\
& \quad \quad \quad 2 U_{s2,2}^{\tilde{e}, j1} \left(c_W^2 m_{e1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s1}^{\tilde{e}, j1} U_{1,2}^{\tilde{e}, j1*} + \delta Z_{2,s1}^{\tilde{e}, j1} U_{2,2}^{\tilde{e}, j1*} \right) \left. \right\} \\
& \quad 2 U_{s1,2}^{\tilde{e}, j1*} \left\{ \right. \\
& \quad \quad c_\beta c_W^2 M_W^2 s_W \left(c_W^2 m_{e1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e}, j2} U_{1,2}^{\tilde{e}, j1} + \delta \bar{Z}_{2,s2}^{\tilde{e}, j2} U_{2,2}^{\tilde{e}, j1} \right) + \\
& \quad \quad \frac{U_{s2,2}^{\tilde{e}, j1}}{2} \left\{ \right. \\
& \quad \quad \quad c_W^4 \left\{ \right. \\
& \quad \quad \quad \quad m_{e1}^2 M_W^2 s_W \left(8 \delta c_\beta s_\beta^2 + c_\beta s_{2\beta} \left(\delta Z_{G-H-} + \delta Z_{G-H-}^* \right) \right) - \\
& \quad \quad \quad m_{e1} s_{2\beta} s_\beta \left\{ \right. \\
& \quad \quad \quad \quad 4 \delta m_{j1}^e M_W^2 s_W - \\
& \quad \quad \quad \quad m_{e1} \left(4 \delta s_W M_W^2 + s_W \left(2 \delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{H-H-} \right) \right) \right) \left. \right\} \left. \right\} \left. \right\} - \\
& \left. \right\}
\end{aligned}$$

$$\begin{aligned}
C(G^-, H^+, \tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}) = & \frac{i e^2 \delta_{j1,j2}}{8 c_\beta^2 c_W^4 M_W^4 s_W^3} \left\{ \right. \\
& 2 \left\{ \begin{aligned} & U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & \frac{c_W^2 M_W^2 s_{2\beta} s_W}{2} \left(c_W^2 m_{e1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) + \\ & \frac{c_W^4 m_{e1}}{2} \left\{ \begin{aligned} & 4 \delta m_{j1}^e M_W^2 s_{2\beta} s_W - \\ & 4 \delta s_W M_W^2 s_{2\beta} + \\ & 2 \delta M_W^2 s_{2\beta} + \\ & M_W^2 \left\{ \begin{aligned} & 8 \delta c_\beta s_\beta + 2 \delta Z_{H-G^-} s_\beta^2 - \\ & s_{2\beta} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-}) \end{aligned} \right\} \end{aligned} \right\} - \\ & c_\beta^2 \left\{ \begin{aligned} & c_W^2 \delta Z_{G^-H^-}^* M_W^2 s_W \left(c_W^2 m_{e1}^2 - c_{2\beta} M_W^2 s_W^2 \right) + \\ & M_W^4 s_W^3 \left\{ \begin{aligned} & 4 \delta s_W s_{2\beta} s_W + \\ & c_W^2 (c_{2\beta} \delta Z_{H-G^-} + s_{2\beta} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-})) \end{aligned} \right\} \end{aligned} \right\} \\ & \frac{c_W^2 M_W^2 s_{2\beta} s_W}{2} \left\{ \begin{aligned} & c_\beta^2 M_W^2 U_{s2,1}^{\tilde{e},j1} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) + \\ & U_{s2,2}^{\tilde{e},j1} \left(c_W^2 m_{e1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \\ & c_\beta M_W^4 U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 s_{2\beta} s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \\ & \frac{U_{s2,1}^{\tilde{e},j1}}{2} \left\{ \begin{aligned} & c_\beta s_{2\beta} (\delta s_W (8 c_W^4 - 8 s_W^2) - 2 c_W^2 s_W (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-} - 4 \delta s_W s_W)) - \\ & c_W^2 s_W \left\{ \begin{aligned} & c_\beta^2 s_{2\beta} (12 \delta c_\beta + 5 \delta s_\beta s_{2\beta}) + s_{2\beta}^2 (\delta s_\beta + \delta c_\beta s_{2\beta} - \delta s_\beta s_\beta^2 (5 - 12 (c_W^2 + s_W^2))) - \\ & c_{2\beta} c_\beta (2 \delta Z_{G-H^-}^* - 2 \delta Z_{H-G^-}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \left. \right\}
\end{aligned}$$

$$C(h^0, h^0, \tilde{u}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}) = -\frac{i e^2 \delta_{j1,j2}}{24 c_W^4 M_W^4 s_\beta^3 s_W^3} \left\{ \begin{array}{l} U_{s2,1}^{\tilde{u},j1*} \left\{ \begin{array}{l} c_W^2 M_W^2 s_\beta s_W \left(6 c_\alpha^2 c_W^2 m_{u_{j1}}^2 + c_{2\alpha} M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) + \\ 2 U_{s1,1}^{\tilde{u},j1} \left\{ \begin{array}{l} 3 c_W^4 m_{u_{j1}} \left\{ \begin{array}{l} 4 c_\alpha^2 \delta m_{j1}^u M_W^2 s_\beta s_W - \\ m_{u_{j1}} \left\{ \begin{array}{l} 2 c_\alpha^2 (2 \delta s_\beta M_W^2 s_W + s_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{hh})))) - \\ \delta Z_{hH} M_W^2 s_{2\alpha} s_\beta s_W \end{array} \right\} \right\} + \\ M_W^4 s_\beta^3 \left\{ \begin{array}{l} c_{2\alpha} (2 \delta s_W s_W^2 (1 - 4 c_W^2) + c_W^2 (6 \delta s_W + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{hh}))) + \\ c_W^2 \delta Z_{hH} s_{2\alpha} s_W (1 - 4 c_W^2) \end{array} \right\} \end{array} \right\} \end{array} \right\} + \\ 2 U_{s2,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} c_W^2 M_W^2 s_\beta s_W \left(3 c_\alpha^2 c_W^2 m_{u_{j1}}^2 - 2 c_{2\alpha} M_W^2 s_\beta^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1} \right) - \\ U_{s1,2}^{\tilde{u},j1} \left\{ \begin{array}{l} 4 M_W^4 s_\beta^3 s_W^3 (c_W^2 \delta Z_{hH} s_{2\alpha} + c_{2\alpha} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{hh}))) - \\ 3 c_W^4 m_{u_{j1}} \left\{ \begin{array}{l} 4 c_\alpha^2 \delta m_{j1}^u M_W^2 s_\beta s_W - \\ m_{u_{j1}} \left\{ \begin{array}{l} 2 c_\alpha^2 (2 \delta s_\beta M_W^2 s_W + s_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{hh})))) - \\ \delta Z_{hH} M_W^2 s_{2\alpha} s_\beta s_W \end{array} \right\} \right\} \end{array} \right\} + \\ c_W^2 M_W^2 s_\beta s_W \left\{ \begin{array}{l} U_{s1,1}^{\tilde{u},j1} \left(6 c_\alpha^2 c_W^2 m_{u_{j1}}^2 + c_{2\alpha} M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1*} \right) + \\ 2 U_{s1,2}^{\tilde{u},j1} \left(3 c_\alpha^2 c_W^2 m_{u_{j1}}^2 - 2 c_{2\alpha} M_W^2 s_\beta^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1*} \right) \end{array} \right\} \end{array} \right\} \end{array} \right\} + \end{array} \right\}$$

$$\begin{aligned}
C(h^0, h^0, \tilde{d}_{j2}^{s2}, \tilde{d}_{j1}^{s1,\dagger}) = & -\frac{i e^2 \delta_{j1,j2}}{24 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(6 c_W^2 m_{d_1}^2 s_\alpha^2 + c_{2\alpha} c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1} \right) + \\ & 2 U_{s1,1}^{\tilde{d},j1} \left\{ \begin{aligned} & 3 c_W^4 m_{d_1} \left\{ \begin{aligned} & 4 c_\beta \delta m_{j1}^d M_W^2 s_\alpha^2 s_W - \\ & 4 \delta c_\beta M_W^2 s_\alpha^2 s_W + \\ & 4 \delta s_W M_W^2 s_\alpha^2 + \\ & c_\beta \left\{ \begin{aligned} & 2 s_\alpha^2 (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{hh})) + \\ & \delta Z_{hH} M_W^2 s_{2\alpha} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta^3 M_W^4 \left\{ \begin{aligned} & c_{2\alpha} (2 \delta s_W s_W^2 (1 + 2 c_W^2) - c_W^2 (6 \delta s_W - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{hh}))) + \\ & c_W^2 \delta Z_{hH} s_{2\alpha} s_W (1 + 2 c_W^2) \end{aligned} \right\} \end{aligned} \right\} \\ & 2 U_{s2,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(3 c_W^2 m_{d_1}^2 s_\alpha^2 + c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1} \right) + \\ & 2 c_\beta^3 M_W^4 s_W^3 \left(c_W^2 \delta Z_{hH} s_{2\alpha} + c_{2\alpha} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{hh})) \right) + \\ & U_{s1,2}^{\tilde{d},j1} \left\{ \begin{aligned} & 3 c_W^4 m_{d_1} \left\{ \begin{aligned} & 4 c_\beta \delta m_{j1}^d M_W^2 s_\alpha^2 s_W - \\ & 4 \delta c_\beta M_W^2 s_\alpha^2 s_W + \\ & 4 \delta s_W M_W^2 s_\alpha^2 + \\ & c_\beta \left\{ \begin{aligned} & 2 s_\alpha^2 (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{hh})) + \\ & \delta Z_{hH} M_W^2 s_{2\alpha} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1} \left(6 c_W^2 m_{d_1}^2 s_\alpha^2 + c_{2\alpha} c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{d},j1} \left(3 c_W^2 m_{d_1}^2 s_\alpha^2 + c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \dots
\end{aligned}$$

$$\begin{aligned}
C(H^0, H^0, \tilde{d}_{j2}^{s2}, \tilde{d}_{j1}^{s1,\dagger}) = & -\frac{\mathbf{i} e^2 \delta_{j1,j2}}{24 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(6 c_\alpha^2 c_W^2 m_{d_1}^2 - c_{2\alpha} c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1} \right) + \\ & 2 U_{s1,1}^{\tilde{d},j1} \left\{ \begin{aligned} & 3 c_W^4 m_{d_1} \left\{ \begin{aligned} & 4 c_\alpha^2 c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & c_\beta \delta Z_{hH} M_W^2 s_{2\alpha} s_W + \\ & 2 c_\alpha^2 (2 \delta c_\beta M_W^2 s_W + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{HH})))) \end{aligned} \right\} \left\{ \right\} + \left\{ \right\} \\ & c_\beta^3 M_W^4 \left\{ \begin{aligned} & c_W^2 \delta Z_{hH} s_{2\alpha} s_W (1 + 2 c_W^2) - \\ & c_{2\alpha} (2 \delta s_W s_W^2 (1 + 2 c_W^2) - c_W^2 (6 \delta s_W - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{HH}))) \end{aligned} \right\} \end{aligned} \right\} \left\{ \right\} + \left\{ \right\} \end{aligned} \right\} \\ & 2 U_{s2,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(3 c_\alpha^2 c_W^2 m_{d_1}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1} \right) + \\ & 2 c_\beta^3 M_W^4 s_W^3 (c_W^2 \delta Z_{hH} s_{2\alpha} - c_{2\alpha} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{HH}))) + \\ & U_{s1,2}^{\tilde{d},j1} \left\{ \begin{aligned} & 3 c_W^4 m_{d_1} \left\{ \begin{aligned} & 4 c_\alpha^2 c_\beta \delta m_{j1}^d M_W^2 s_W - \\ & c_\beta \delta Z_{hH} M_W^2 s_{2\alpha} s_W + \\ & 2 c_\alpha^2 (2 \delta c_\beta M_W^2 s_W + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{HH})))) \end{aligned} \right\} \left\{ \right\} + \left\{ \right\} \\ & 2 c_\beta^3 M_W^4 s_W^3 (c_W^2 \delta Z_{hH} s_{2\alpha} - c_{2\alpha} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{HH}))) \end{aligned} \right\} \left\{ \right\} + \left\{ \right\} \end{aligned} \right\} \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1} \left(6 c_\alpha^2 c_W^2 m_{d_1}^2 - c_{2\alpha} c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{d},j1} \left(3 c_\alpha^2 c_W^2 m_{d_1}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned}
\end{aligned}$$

$$\begin{aligned}
C(A^0, A^0, \tilde{u}_{j2}^{s2}, \tilde{u}_{j1}^{s1, \dagger}) = & -\frac{i e^2 \delta_{j1, j2}}{24 c_W^4 M_W^4 s_\beta^3 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{u}, j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_\beta s_W \left(6 c_\beta^2 c_W^2 m_{u_1}^2 + c_{2\beta} M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u}, j1} U_{1,1}^{\tilde{u}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{u}, j1} U_{2,1}^{\tilde{u}, j1} \right) + \\ & 2 U_{s1,1}^{\tilde{u}, j1} \left\{ \begin{aligned} & 6 c_\beta c_W^4 m_{u_1} \left\{ \begin{aligned} & \delta m_{j1}^u M_W^2 s_{2\beta} s_W - \\ & c_\beta (2 \delta s_\beta M_W^2 s_W + s_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{AA})))) - \end{aligned} \right\} + \\ & M_W^4 s_\beta^3 \left\{ \begin{aligned} & c_\beta^2 (c_W^2 (6 \delta s_W + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{AA})) - \delta s_W (6 s_W^2 - 8 s_W^4)) - \\ & s_\beta^2 (2 \delta s_W s_W^2 (1 - 4 c_W^2) + c_W^2 (6 \delta s_W + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{AA}))) + \\ & c_W^2 \delta Z_{AG} s_{2\beta} s_W (1 - 4 c_W^2) \end{aligned} \right\} \end{aligned} \right\} \\ & 2 U_{s2,2}^{\tilde{u}, j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_\beta s_W \left(3 c_\beta^2 c_W^2 m_{u_1}^2 - 2 c_{2\beta} M_W^2 s_\beta^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u}, j1} U_{1,2}^{\tilde{u}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{u}, j1} U_{2,2}^{\tilde{u}, j1} \right) + \\ & 2 U_{s1,2}^{\tilde{u}, j1} \left\{ \begin{aligned} & 3 c_\beta c_W^4 m_{u_1} \left\{ \begin{aligned} & \delta m_{j1}^u M_W^2 s_{2\beta} s_W - \\ & \frac{m_{u_1}}{2} \left\{ \begin{aligned} & 2 \delta s_W M_W^2 s_{2\beta} + \\ & s_W \left\{ \begin{aligned} & \delta M_W^2 s_{2\beta} + \\ & M_W^2 (4 c_\beta \delta s_\beta - 2 \delta Z_{AG} s_\beta^2 - s_{2\beta} (2 \delta Z_e + \delta Z_{AA})) \end{aligned} \right\} \end{aligned} \right\} + \\ & 2 M_W^4 s_\beta^3 s_W^3 \left\{ \begin{aligned} & 2 \delta s_W s_\beta^2 s_W - c_\beta^2 (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{AA})) - \\ & c_W^2 (\delta Z_{AG} s_{2\beta} - s_\beta^2 (2 \delta Z_e + \delta Z_{AA})) \end{aligned} \right\} \end{aligned} \right\} \\ & c_W^2 M_W^2 s_\beta s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u}, j1} \left(6 c_\beta^2 c_W^2 m_{u_1}^2 + c_{2\beta} M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{u}, j2} U_{1,1}^{\tilde{u}, j1*} + \delta Z_{2,s2}^{\tilde{u}, j2} U_{2,1}^{\tilde{u}, j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{u}, j1} \left(3 c_\beta^2 c_W^2 m_{u_1}^2 - 2 c_{2\beta} M_W^2 s_\beta^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{u}, j2} U_{1,2}^{\tilde{u}, j1*} + \delta Z_{2,s2}^{\tilde{u}, j2} U_{2,2}^{\tilde{u}, j1*} \right) \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}
\end{aligned}$$

$$\begin{aligned}
C(G^0, G^0, \tilde{u}_{j2}^{s2}, \tilde{u}_{j1}^{s1, \dagger}) = & -\frac{i e^2 \delta_{j1, j2}}{24 c_W^4 M_W^4 s_\beta s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{u}, j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_\beta s_W \left(6 c_W^2 m_{u_1}^2 - c_{2\beta} M_W^2 (1 - 4 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u}, j1} U_{1,1}^{\tilde{u}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{u}, j1} U_{2,1}^{\tilde{u}, j1} \right) - \\ & 6 c_W^4 m_{u_1}^2 (2 \delta s_W M_W^2 s_\beta + s_W (\delta M_W^2 s_\beta + M_W^2 (2 \delta s_\beta - c_\beta \delta Z_{AG} - s_\beta (2 \delta Z_e + \delta Z_{GG}))) \right) - \\ & 2 U_{s1,1}^{\tilde{u}, j1} \left\{ \begin{aligned} & 12 c_W^4 \delta m_{j1}^u m_{u_1} M_W^2 s_W + \\ & s_\beta \left\{ \begin{aligned} & c_W^2 \delta Z_{AG} s_{2\beta} s_W (1 - 4 c_W^2) + \\ & M_W^4 \left\{ \begin{aligned} & s_\beta^2 (c_W^2 (6 \delta s_W + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{GG})) - \delta s_W (6 s_W^2 - 8 s_W^4)) - \\ & c_\beta^2 \left\{ \begin{aligned} & 2 \delta s_W s_W^2 (1 - 4 c_W^2) + \\ & c_W^2 (6 \delta s_W + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & 2 U_{s2,2}^{\tilde{u}, j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_\beta s_W \left(3 c_W^2 m_{u_1}^2 + 2 c_{2\beta} M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u}, j1} U_{1,2}^{\tilde{u}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{u}, j1} U_{2,2}^{\tilde{u}, j1} \right) - \\ & 2 U_{s1,2}^{\tilde{u}, j1} \left\{ \begin{aligned} & 3 c_W^4 m_{u_1}^2 (2 \delta s_W M_W^2 s_\beta + s_W (\delta M_W^2 s_\beta + M_W^2 (2 \delta s_\beta - c_\beta \delta Z_{AG} - s_\beta (2 \delta Z_e + \delta Z_{GG})))) + \\ & s_\beta \left\{ \begin{aligned} & 2 M_W^4 s_W^3 (c_W^2 \delta Z_{AG} s_{2\beta} - c_{2\beta} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{GG}))) - \\ & 6 c_W^4 \delta m_{j1}^u m_{u_1} M_W^2 s_W \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 M_W^2 s_\beta s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u}, j1} \left(6 c_W^2 m_{u_1}^2 - c_{2\beta} M_W^2 (1 - 4 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{u}, j2} U_{1,1}^{\tilde{u}, j1*} + \delta Z_{2,s2}^{\tilde{u}, j2} U_{2,1}^{\tilde{u}, j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{u}, j1} \left(3 c_W^2 m_{u_1}^2 + 2 c_{2\beta} M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{u}, j2} U_{1,2}^{\tilde{u}, j1*} + \delta Z_{2,s2}^{\tilde{u}, j2} U_{2,2}^{\tilde{u}, j1*} \right) \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}
\right.
\end{aligned}$$

$$\begin{aligned}
C(A^0, G^0, \tilde{u}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}) = & -\frac{i e^2 \delta_{j1,j2}}{24 c_W^4 M_W^4 s_\beta^2 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\beta} s_W \left(3 c_W^2 m_{u_{j1}}^2 + M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) - \\ & 6 c_W^4 m_{u_{j1}}^2 \left\{ \begin{aligned} & 2 \delta s_W M_W^2 s_{2\beta} + \\ & \frac{s_W}{2} \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\beta} + \\ & M_W^2 (8 c_\beta \delta s_\beta - 2 \delta Z_{AG} - s_{2\beta} (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} - \end{aligned} \right\} + \\ & c_\beta \left\{ \begin{aligned} & 24 c_W^4 \delta m_{j1}^u m_{u_{j1}} M_W^2 s_\beta s_W + \\ & 2 M_W^4 s_\beta^3 \left\{ \begin{aligned} & 4 \delta s_W s_W^2 - 4 c_W^4 s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}) + \\ & c_W^2 (4 \delta s_W (3 - 4 s_W^2) + s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \\ & U_{s2,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\beta} s_W \left(3 c_W^2 m_{u_{j1}}^2 - 4 M_W^2 s_\beta^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1} \right) + \\ & 2 U_{s1,2}^{\tilde{u},j1} \left\{ \begin{aligned} & c_\beta \left(12 c_W^4 \delta m_{j1}^u m_{u_{j1}} M_W^2 s_\beta s_W - 4 M_W^4 s_\beta^3 s_W^3 (4 \delta s_W s_W + c_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) \right) - \\ & \frac{3 c_W^4 m_{u_{j1}}^2}{2} \left\{ \begin{aligned} & 4 \delta s_W M_W^2 s_{2\beta} + \\ & s_W \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\beta} + \\ & M_W^2 (8 c_\beta \delta s_\beta - 2 \delta Z_{AG} - s_{2\beta} (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \\ & c_W^2 M_W^2 s_{2\beta} s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1} \left(3 c_W^2 m_{u_{j1}}^2 + M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1*} \right) + \\ & U_{s1,2}^{\tilde{u},j1} \left(3 c_W^2 m_{u_{j1}}^2 - 4 M_W^2 s_\beta^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}$$

$$\begin{aligned}
C(A^0, A^0, \tilde{a}_{j2}^{\tilde{s}2}, \tilde{a}_{j1}^{\tilde{s}1, \dagger}) = & -\frac{i e^2 \delta_{j1,j2}}{24 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_W \left(3 c_W^2 m_{d_1}^2 s_{2\beta} s_\beta + c_{2\beta} c_\beta^3 M_W^2 (1 + 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1} \right) + \\ & 2 U_{s1,1}^{\tilde{d},j1} \left\{ \begin{aligned} & 6 c_W^4 m_{d_1} s_\beta \left\{ \begin{aligned} & \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \\ & \frac{s_{2\beta}}{2} (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{AA}))) + \end{aligned} \right\} + \\ & c_\beta^3 M_W^4 \left\{ \begin{aligned} & c_\beta^2 (2 \delta s_W s_W^2 (1 + 2 c_W^2) - c_W^2 (6 \delta s_W - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{AA}))) + \\ & s_\beta^2 (c_W^2 (6 \delta s_W - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{AA})) - \delta s_W (6 s_W^2 - 4 s_W^4)) + \\ & c_W^2 \delta Z_{AG} s_{2\beta} s_W (1 + 2 c_W^2) \end{aligned} \right\} \end{aligned} \right\} + \\ & 2 U_{s2,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(3 c_W^2 m_{d_1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1} \right) + \\ & 2 U_{s1,2}^{\tilde{d},j1} \left\{ \begin{aligned} & c_\beta^3 M_W^4 s_W^3 (c_W^2 \delta Z_{AG} s_{2\beta} + c_{2\beta} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{AA}))) + \\ & 3 c_W^4 m_{d_1} s_\beta \left\{ \begin{aligned} & \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \\ & \frac{s_{2\beta}}{2} (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{AA}))) + \end{aligned} \right\} + \\ & M_W^2 s_W (c_\beta^2 \delta Z_{AG} + 2 \delta c_\beta s_\beta) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1} \left(6 c_W^2 m_{d_1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{d},j1} \left(3 c_W^2 m_{d_1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}
\end{aligned}$$

$$C(G^0, G^0, \tilde{d}_{j2}^2, \tilde{d}_{j1}^{1,\dagger}) = -\frac{i e^2 \delta_{j1,j2}}{24 c_\beta c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1*} \left\{ c_\beta c_W^2 M_W^2 s_W \left(6 c_W^2 m_{d_1}^2 - c_{2\beta} M_W^2 (1 + 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1} \right) - \right. \\ & \left. 2 U_{s1,1}^{\tilde{d},j1} \left\{ c_\beta \left\{ \begin{aligned} & 6 c_W^4 m_{d_1}^2 (M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta) + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{GG}))) - \\ & 12 c_W^4 \delta m_{j1}^d m_{d_1} M_W^2 s_W + \\ & c_W^2 \delta Z_{AG} s_{2\beta} s_W (1 + 2 c_W^2) - \\ & s_\beta^2 (c_W^2 (6 \delta s_W - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{GG})) - \delta s_W (6 s_W^2 - 4 s_W^4)) - \\ & c_\beta^2 \left\{ \begin{aligned} & 2 \delta s_W s_W^2 (1 + 2 c_W^2) - \\ & c_W^2 (6 \delta s_W - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \right\} + \\ & 2 U_{s2,2}^{\tilde{d},j1*} \left\{ c_\beta c_W^2 M_W^2 s_W \left(3 c_W^2 m_{d_1}^2 - c_{2\beta} M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1} \right) - \right. \\ & \left. 2 U_{s1,2}^{\tilde{d},j1} \left\{ c_\beta \left\{ \begin{aligned} & 3 c_W^4 m_{d_1}^2 (M_W^2 s_W (2 \delta c_\beta + \delta Z_{AG} s_\beta) + c_\beta (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{GG})))) - \\ & M_W^4 s_W^3 (c_W^2 \delta Z_{AG} s_{2\beta} - c_{2\beta} (2 \delta s_W s_W + c_W^2 (2 \delta Z_e + \delta Z_{GG}))) + \\ & 6 c_W^4 \delta m_{j1}^d m_{d_1} M_W^2 s_W \end{aligned} \right\} \right\} + \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1} (6 c_W^2 m_{d_1}^2 - c_{2\beta} M_W^2 (1 + 2 c_W^2)) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & 2 U_{s1,2}^{\tilde{d},j1} (3 c_W^2 m_{d_1}^2 - c_{2\beta} M_W^2 s_W^2) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\}$$

$$C(A^0, G^0, \tilde{d}_{j2}^2, \tilde{d}_{j1}^{1,\dagger}) = \frac{i e^2 \delta_{j1,j2}}{24 c_\beta^2 c_W^4 M_W^4 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1*} \left\{ c_W^2 M_W^2 s_{2\beta} s_W \left(3 c_W^2 m_{d_1}^2 - c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1} \right) - \right. \\ & \left. U_{s1,1}^{\tilde{d},j1} \left\{ \begin{aligned} & 6 c_W^4 m_{d_1}^2 \left\{ \begin{aligned} & M_W^2 s_W (\delta Z_{AG} + 4 \delta c_\beta s_\beta) + \\ & \frac{s_{2\beta}}{2} (4 \delta s_W M_W^2 + s_W (2 \delta M_W^2 - M_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}))) \end{aligned} \right\} - \\ & s_\beta \left\{ \begin{aligned} & 24 c_\beta c_W^4 \delta m_{j1}^d m_{d_1} M_W^2 s_W - \\ & 2 c_\beta^3 M_W^4 \left\{ \begin{aligned} & 4 \delta s_W s_W^2 + 2 c_W^4 s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}) - \\ & c_W^2 (4 \delta s_W (3 - 2 s_W^2) - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) \end{aligned} \right\} \end{aligned} \right\} \right\} + \\ & U_{s2,2}^{\tilde{d},j1*} \left\{ c_W^2 M_W^2 s_{2\beta} s_W \left(3 c_W^2 m_{d_1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1} \right) + \right. \\ & \left. 2 U_{s1,2}^{\tilde{d},j1} \left\{ \begin{aligned} & s_\beta \left(12 c_\beta c_W^4 \delta m_{j1}^d m_{d_1} M_W^2 s_W - 2 c_\beta^3 M_W^4 s_W^3 (4 \delta s_W s_W + c_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG})) \right) - \\ & 3 c_W^4 m_{d_1}^2 \left\{ \begin{aligned} & M_W^2 s_W (\delta Z_{AG} + 4 \delta c_\beta s_\beta) + \\ & \frac{s_{2\beta}}{2} (4 \delta s_W M_W^2 + s_W (2 \delta M_W^2 - M_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}))) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 M_W^2 s_{2\beta} s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1} (3 c_W^2 m_{d_1}^2 - c_\beta^2 M_W^2 (1 + 2 c_W^2)) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & U_{s1,2}^{\tilde{d},j1} (3 c_W^2 m_{d_1}^2 - 2 c_\beta^2 M_W^2 s_W^2) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\}$$

$$\begin{aligned}
C(h^0, H^0, \tilde{u}_{j2}^{s2}, \tilde{u}_{j1}^{s1, \dagger}) = & -\frac{i e^2 \delta_{j1, j2}}{24 c_W^4 M_W^4 s_\beta^3 s_W^3} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{u}, j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\alpha} s_\beta s_W \left(3 c_W^2 m_{u_{j1}}^2 + M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u}, j1} U_{1,1}^{\tilde{u}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{u}, j1} U_{2,1}^{\tilde{u}, j1} \right) + \\ & M_W^4 s_{2\alpha} s_\beta^3 \left(4 \delta s_W s_W^2 (1 - 4 c_W^2) + c_W^2 (12 \delta s_W + s_W (1 - 4 c_W^2) (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH})) \right) + \\ & 3 c_W^4 m_{u_{j1}} \left\{ \begin{aligned} & 4 \delta m_{j1}^u M_W^2 s_{2\alpha} s_\beta s_W - \\ & 4 \delta s_W M_W^2 s_{2\alpha} s_\beta + \\ & 4 \delta s_\beta M_W^2 s_{2\alpha} + \\ & 2 \delta M_W^2 s_{2\alpha} - \\ & M_W^2 \left\{ \begin{aligned} & 2 \delta Z_{hH} (c_\alpha^2 + s_\alpha^2) + \\ & s_{2\alpha} (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & U_{s2,2}^{\tilde{u}, j1*} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\alpha} s_\beta s_W \left(3 c_W^2 m_{u_{j1}}^2 - 4 M_W^2 s_\beta^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u}, j1} U_{1,2}^{\tilde{u}, j1} + \delta \bar{Z}_{2,s1}^{\tilde{u}, j1} U_{2,2}^{\tilde{u}, j1} \right) - \\ & 4 M_W^4 s_{2\alpha} s_\beta^3 s_W^3 \left(4 \delta s_W s_W + c_W^2 (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH}) \right) - \\ & 4 \delta m_{j1}^u M_W^2 s_{2\alpha} s_\beta s_W - \\ & 4 \delta s_W M_W^2 s_{2\alpha} s_\beta + \\ & 4 \delta s_\beta M_W^2 s_{2\alpha} + \\ & 2 \delta M_W^2 s_{2\alpha} - \\ & M_W^2 \left\{ \begin{aligned} & 2 \delta Z_{hH} (c_\alpha^2 + s_\alpha^2) + \\ & s_{2\alpha} (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH}) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_W^2 M_W^2 s_{2\alpha} s_\beta s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u}, j1} \left(3 c_W^2 m_{u_{j1}}^2 + M_W^2 s_\beta^2 (1 - 4 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{u}, j2} U_{1,1}^{\tilde{u}, j1*} + \delta Z_{2,s2}^{\tilde{u}, j2} U_{2,1}^{\tilde{u}, j1*} \right) + \\ & U_{s1,2}^{\tilde{u}, j1} \left(3 c_W^2 m_{u_{j1}}^2 - 4 M_W^2 s_\beta^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{u}, j2} U_{1,2}^{\tilde{u}, j1*} + \delta Z_{2,s2}^{\tilde{u}, j2} U_{2,2}^{\tilde{u}, j1*} \right) \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}$$

$$\begin{aligned}
C(h^0, H^0, \tilde{a}_{j2}^2, \tilde{a}_{j1}^{1,\dagger}) = \frac{i e^2 \delta_{j1,j2}}{24 c_\beta^3 c_W^4 M_W^4 s_W^3} & \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_{2\alpha} s_W \left(3 c_W^2 m_{d_1}^2 - c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1} \right) - \\ & U_{s1,1}^{\tilde{d},j1} \left\{ \begin{aligned} & c_\beta^3 M_W^4 s_{2\alpha} (4 \delta s_W s_W^2 (1 + 2 c_W^2) - c_W^2 (12 \delta s_W - s_W (1 + 2 c_W^2) (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH}))) - \\ & 3 c_W^4 m_{d_1} \left\{ \begin{aligned} & m_{d_1} \left\{ \begin{aligned} & 4 c_\beta \delta m_{j1}^d M_W^2 s_{2\alpha} s_W - \\ & 4 \delta c_\beta M_W^2 s_{2\alpha} s_W + \\ & 4 \delta s_W M_W^2 s_{2\alpha} + \\ & c_\beta \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\alpha} + \\ & s_W \left\{ \begin{aligned} & M_W^2 \left\{ \begin{aligned} & 2 \delta Z_{hH} (c_\alpha^2 + s_\alpha^2) - \\ & s_{2\alpha} (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta c_W^2 M_W^2 s_{2\alpha} s_W \left(3 c_W^2 m_{d_1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1} \right) - \\ & U_{s2,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & 2 c_\beta^3 M_W^4 s_{2\alpha} s_W^3 (4 \delta s_W s_W + c_W^2 (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH})) - \\ & U_{s1,2}^{\tilde{d},j1} \left\{ \begin{aligned} & 3 c_W^4 m_{d_1} \left\{ \begin{aligned} & m_{d_1} \left\{ \begin{aligned} & 4 c_\beta \delta m_{j1}^d M_W^2 s_{2\alpha} s_W - \\ & 4 \delta c_\beta M_W^2 s_{2\alpha} s_W + \\ & 4 \delta s_W M_W^2 s_{2\alpha} + \\ & c_\beta \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\alpha} + \\ & s_W \left\{ \begin{aligned} & M_W^2 \left\{ \begin{aligned} & 2 \delta Z_{hH} (c_\alpha^2 + s_\alpha^2) - \\ & s_{2\alpha} (4 \delta Z_e + \delta Z_{hh} + \delta Z_{HH}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta c_W^2 M_W^2 s_{2\alpha} s_W \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1} \left(3 c_W^2 m_{d_1}^2 - c_\beta^2 M_W^2 (1 + 2 c_W^2) \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1*} \right) + \\ & U_{s1,2}^{\tilde{d},j1} \left(3 c_W^2 m_{d_1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}
\end{aligned}$$

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$$C_{307}(h^0, G^+, \tilde{d}_{j2}^2, \tilde{u}_{j1}^{s1,\dagger}) = -\frac{\sqrt{2}ie^2 c_\beta}{M_W^4 s_{2\beta}^3 s_W^3}$$

[illegible]

$$\begin{aligned}
C(A^0, H^-, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2, \dagger}) = & -\frac{\sqrt{2} e^2}{M_W^4 s_{2\beta}^3 s_W^3} \left\{ \text{CKM}_{j1,j2}^* \left[\begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left[\begin{aligned} & U_{s2,1}^{\tilde{d},j2} \left[\begin{aligned} & \frac{M_W^2 s_{2\beta} s_W}{8} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) \left(4 c_\beta^4 m_{u_{j1}}^2 - c_{2\beta} M_W^2 s_{2\beta}^2 - 4 m_{d_{j2}}^2 s_\beta^4 \right) + \right. \\ & \left. 2 \delta m_{j1}^u m_{u_{j1}} M_W^2 s_{2\beta} s_W + \right. \\ & \left. \left. \left. c_\beta^4 \left\{ m_{u_{j1}}^2 \left\{ c_\beta \left\{ s_W \left\{ s_\beta \left\{ M_W^2 \left\{ \begin{aligned} & 4 \delta s_\beta M_W^2 + \\ & 2 \delta M_W^2 - \\ & 4 \delta Z_e + \\ & \delta Z_{AA} + \\ & \delta Z_{H^- H^-} \end{aligned} \right\} \right\} \right\} \right\} \right\} \right\} \right\} + \right. \\ & \left. \left. \left. c_\beta^3 M_W^4 \left\{ \begin{aligned} & c_{2\beta} (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{H^- H^-})) - \\ & s_{2\beta} s_W (\delta Z_{AG} + \delta Z_{G^- H^-}) \end{aligned} \right\} - \right. \right. \right\} \right\} \right\} - \\ & \left. \left. \left. s_\beta^3 \left\{ m_{d_{j2}}^2 \left\{ \frac{s_{2\beta}}{2} \left\{ s_W \left\{ M_W^2 \left\{ \begin{aligned} & 4 \delta s_W M_W^2 + \\ & 2 \delta M_W^2 - \\ & 4 \delta Z_e + \\ & \delta Z_{AA} + \\ & \delta Z_{H^- H^-} \end{aligned} \right\} \right\} \right\} \right\} \right\} \right\} + \right. \\ & \left. \left. \left. \frac{M_W^2 s_{2\beta} s_W}{2} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \left(\frac{c_{2\beta} M_W^2 s_{2\beta}^2}{4} - c_\beta^4 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^4 \right) + \right. \\ & \left. \frac{m_{d_{j2}} m_{u_{j1}} s_{2\beta}}{2} U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{d},j2} (\delta Z_{AG} - \delta Z_{G^- H^-}) \right\} \right. \right. \right\} \right\} \right\} - \\ & \left. \delta \text{CKM}_{j1,j2}^* M_W^2 s_{2\beta} s_W U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \left(\frac{c_{2\beta} M_W^2 s_{2\beta}^2}{4} - c_\beta^4 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^4 \right) \right] \right] \right] - \left. \right\}
\end{aligned}
\end{aligned}$$

$$\begin{aligned}
C(G^0, G^-, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = & \frac{e^2}{2\sqrt{2} M_W^4 s_{2\beta} s_W^3} \left\{ \text{CKM}_{j1,j2}^* \left[\begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & \frac{M_W^2 s_{2\beta} s_W}{2} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) - \\ & m_{d_2}^2 s_W \left\{ \begin{aligned} & \delta M_W^2 s_{2\beta} + \\ & \frac{M_W^2}{2} \left\{ \begin{aligned} & 8 \delta c_\beta s_\beta + 2 s_\beta^2 (\delta Z_{AG} + \delta Z_{H-G^-}) - \\ & s_{2\beta} (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-}) \end{aligned} \right\} \end{aligned} \right\} - \\ & \frac{M_W^4 s_{2\beta}}{2} \left\{ \begin{aligned} & s_{2\beta} s_W (\delta Z_{AG} + \delta Z_{H-G^-}) + \\ & (c_\beta^2 - s_\beta^2) (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-})) \end{aligned} \right\} + \\ & M_W^2 s_\beta \left(4 \delta m_{j1}^u m_{u_1} s_W + 4 m_{d_2} \left(\delta s_W m_{d_2} - \delta m_{j2}^d s_W \right) \right) - \\ & c_\beta \left\{ \begin{aligned} & 4 \delta s_W M_W^2 s_\beta + \\ & 2 \delta M_W^2 s_\beta + \\ & m_{u_1}^2 \left\{ \begin{aligned} & 4 \delta s_\beta - \\ & M_W^2 \left\{ \begin{aligned} & c_\beta (\delta Z_{AG} + \delta Z_{H-G^-}) - \\ & s_\beta (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & M_W^2 s_W \left\{ \begin{aligned} & \frac{s_{2\beta} U_{s2,1}^{\tilde{d},j2}}{2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) - \\ & m_{d_2} m_{u_1} U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{d},j2} (\delta Z_{AG} - \delta Z_{H-G^-}) \end{aligned} \right\} \end{aligned} \right] + \\ & \delta \text{CKM}_{j1,j2}^* M_W^2 s_{2\beta} s_W U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \end{aligned} \right\}
\end{aligned}$$

$$\begin{aligned}
C(A^0, G^-, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = \frac{e^2}{\sqrt{2} M_W^4 s_{2\beta}^2 s_W^3} & \left\{ \text{CKM}_{j1,j2}^* \left[\begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & \frac{M_W^2 s_{2\beta} s_W}{4} \left(M_W^2 s_{2\beta}^2 - 2 \left(c_\beta^2 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^2 \right) \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) - \\ & \left\{ \begin{aligned} & 2 \delta m_{j1}^u m_{u_{j1}} M_W^2 s_{2\beta} s_W + \\ & M_W^2 s_W \left(c_\beta^2 \delta Z_{H-G^-} + \delta Z_{AG} s_\beta^2 \right) - \\ & 4 \delta s_W M_W^2 s_\beta + \\ & 4 \delta s_\beta M_W^2 + \\ & 2 \delta M_W^2 - \\ & M_W^2 \left\{ \begin{aligned} & 4 \delta Z_e + \\ & \delta Z_{AA} + \\ & \delta Z_{G^-G^-} \end{aligned} \right\} \end{aligned} \right\} + \\ & \left\{ \begin{aligned} & 2 \delta m_{j2}^d m_{d_{j2}} M_W^2 s_{2\beta} s_W + \\ & 4 \delta s_W s_{2\beta} + \\ & c_\beta^2 M_W^4 \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & c_{2\beta} (\delta Z_{AG} - \delta Z_{H-G^-}) - \\ & s_{2\beta} (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-}) \end{aligned} \right\} \end{aligned} \right\} - \\ & M_W^2 s_W \left(c_\beta^2 \delta Z_{AG} + 4 \delta c_\beta s_\beta + \delta Z_{H-G^-} s_\beta^2 \right) + \\ & \frac{s_{2\beta}}{2} \left\{ \begin{aligned} & 4 \delta s_W M_W^2 + \\ & s_W (2 \delta M_W^2 - M_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \\ & M_W^2 s_{2\beta} s_W \left\{ \begin{aligned} & \frac{m_{d_{j2}} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*}}{2} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2} \right) - \\ & \frac{U_{s2,1}^{\tilde{d},j2}}{4} \left(M_W^2 s_{2\beta}^2 - 2 \left(c_\beta^2 m_{u_{j1}}^2 + m_{d_{j2}}^2 s_\beta^2 \right) \right) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \end{aligned} \right\} - \\ & U_{s2,2}^{\tilde{d},j2} \left\{ \begin{aligned} & 2 c_\beta M_W^2 U_{s1,2}^{\tilde{u},j1*} \left(\delta m_{j2}^d m_{u_{j1}} s_\beta s_W + m_{d_{j2}} \left(\delta m_{j1}^u s_\beta s_W - m_{u_{j1}} (2 \delta s_W s_\beta + \delta s_\beta s_W) \right) \right) - \\ & m_{d_{j2}} m_{u_{j1}} s_W \left\{ \begin{aligned} & U_{s1,2}^{\tilde{u},j1*} \left(\delta M_W^2 s_{2\beta} + M_W^2 s_\beta (2 \delta c_\beta - c_\beta (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-})) \right) - \\ & \frac{M_W^2 s_{2\beta}}{2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \\ & \delta \text{CKM}_{j1,j2}^* M_W^2 s_{2\beta} s_W \left(m_{d_{j2}} m_{u_{j1}} U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{d},j2} - U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_{j1}}^2 - m_{d_{j2}}^2 s_\beta^2 \right) \right) \end{aligned} \right\}
\end{aligned}$$

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$$C(A^0, H^+, \tilde{a}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}) = \frac{\sqrt{2}e^2}{M_W^4 s_{2\beta}^3 s_W^3}$$

$$\begin{aligned}
C(G^0, G^+, \tilde{d}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}) = & -\frac{e^2}{2\sqrt{2}M_W^4 s_{2\beta} s_W^3} \left\{ \text{CKM}_{j1,j2} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j2*} \left\{ \begin{aligned} & \frac{M_W^2 s_{2\beta} s_W}{2} \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) - \\ & m_{d_2}^2 s_W \left\{ \begin{aligned} & \delta M_W^2 s_{2\beta} + \\ & \frac{M_W^2}{2} \left\{ \begin{aligned} & 8 \delta c_\beta s_\beta + 2 s_\beta^2 (\delta Z_{AG} + \delta Z_{G^-H^-}) - \end{aligned} \right\} \end{aligned} \right\} - \\ & \frac{M_W^4 s_{2\beta}}{2} \left\{ \begin{aligned} & s_{2\beta} s_W (\delta Z_{AG} + \delta Z_{G^-H^-}) + \\ & (c_\beta^2 - s_\beta^2) (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-})) \end{aligned} \right\} + \\ & M_W^2 s_\beta \left(4 \delta m_{j1}^u m_{u_1} s_W + 4 m_{d_2} (\delta s_W m_{d_2} - \delta m_{j2}^d s_W) \right) - \\ & c_\beta \left\{ \begin{aligned} & 4 \delta s_W M_W^2 s_\beta + \\ & m_{u_1}^2 \left\{ \begin{aligned} & 2 \delta M_W^2 s_\beta + \\ & s_W \left\{ \begin{aligned} & 4 \delta s_\beta - \\ & M_W^2 \left\{ \begin{aligned} & c_\beta (\delta Z_{AG} + \delta Z_{G^-H^-}) - \\ & s_\beta (4 \delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & M_W^2 s_W \left\{ \begin{aligned} & \frac{s_{2\beta} U_{s1,1}^{\tilde{u},j1}}{2} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) - \\ & m_{d_2} m_{u_1} U_{s1,2}^{\tilde{u},j1} U_{s2,2}^{\tilde{d},j2*} (\delta Z_{AG} - \delta Z_{G^-H^-}) \end{aligned} \right\} \end{aligned} \right\} + \\ & \delta \text{CKM}_{j1,j2} M_W^2 s_{2\beta} s_W U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \left(m_{d_2}^2 - m_{u_1}^2 - c_{2\beta} M_W^2 \right) \end{aligned} \right\}
\end{aligned}$$

$$C(A^0, G^+, \tilde{d}_{j_2}^{s2}, \tilde{u}_{j_1}^{s1,\dagger}) = -\frac{e^2}{\sqrt{2} M_W^4 s_{2\beta}^2 s_W^3} \left\{ \text{CKM}_{j_1,j_2} \left[U_{s2,1}^{\tilde{d},j_2*} \left(\frac{M_W^2 s_{2\beta} s_W}{4} \left(M_W^2 s_{2\beta}^2 - 2 \left(c_\beta^2 m_{u_1}^2 + m_{d_2}^2 s_\beta^2 \right) \right) \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j_1} U_{1,1}^{\tilde{u},j_1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j_1} U_{2,1}^{\tilde{u},j_1} \right) - \right. \right. \right. \\ \left. \left. \left. \begin{aligned} & 2 \delta m_{j_1}^u m_{u_1} M_W^2 s_{2\beta} s_W + \\ & M_W^2 s_W \left(c_\beta^2 \delta Z_{G^-H^-} + \delta Z_{AG} s_\beta^2 \right) - \\ & 4 \delta s_W M_W^2 s_\beta + \\ & 4 \delta s_\beta M_W^2 + \\ & 2 \delta M_W^2 - \\ & M_W^2 \left\{ \begin{array}{l} 4 \delta Z_e + \\ \delta Z_{AA} + \\ \delta Z_{G^-G^-} \end{array} \right\} \end{aligned} \right\} \right] + \\ \left. \left. \left. \begin{aligned} & 2 \delta m_{j_2}^d m_{d_2} M_W^2 s_{2\beta} s_W + \\ & c_\beta^2 M_W^4 \left\{ \begin{array}{l} 4 \delta s_W s_{2\beta} + \\ s_W \left\{ \begin{array}{l} c_{2\beta} (\delta Z_{AG} - \delta Z_{G^-H^-}) - \\ s_{2\beta} (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-}) \end{array} \right\} \end{array} \right\} - \\ & m_{d_2}^2 \left\{ \begin{array}{l} M_W^2 s_W \left(c_\beta^2 \delta Z_{AG} + 4 \delta c_\beta s_\beta + \delta Z_{G^-H^-} s_\beta^2 \right) + \\ \frac{s_{2\beta}}{2} \left\{ \begin{array}{l} 4 \delta s_W M_W^2 + \\ s_W (2 \delta M_W^2 - M_W^2 (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-})) \end{array} \right\} \end{array} \right\} \end{aligned} \right\} \right] - \\ \left. \left. \left. \begin{aligned} & M_W^2 s_{2\beta} s_W \left\{ \begin{array}{l} \frac{m_{d_2} m_{u_1} U_{s2,2}^{\tilde{d},j_2*}}{2} \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j_1} U_{1,2}^{\tilde{u},j_1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j_1} U_{2,2}^{\tilde{u},j_1} \right) - \\ \frac{U_{s1,1}^{\tilde{u},j_1}}{4} \left(M_W^2 s_{2\beta}^2 - 2 \left(c_\beta^2 m_{u_1}^2 + m_{d_2}^2 s_\beta^2 \right) \right) \left(\delta Z_{1,s2}^{\tilde{d},j_2} U_{1,1}^{\tilde{d},j_2*} + \delta Z_{2,s2}^{\tilde{d},j_2} U_{2,1}^{\tilde{d},j_2*} \right) \end{array} \right\} - \\ & U_{s1,2}^{\tilde{u},j_1} \left\{ \begin{array}{l} 2 c_\beta M_W^2 U_{s2,2}^{\tilde{d},j_2*} \left(\delta m_{j_2}^d m_{u_1} s_\beta s_W + m_{d_2} \left(\delta m_{j_1}^u s_\beta s_W - m_{u_1} (2 \delta s_W s_\beta + \delta s_\beta s_W) \right) \right) - \\ m_{d_2} m_{u_1} s_W \left\{ \begin{array}{l} U_{s2,2}^{\tilde{d},j_2*} \left(\delta M_W^2 s_{2\beta} + M_W^2 s_\beta (2 \delta c_\beta - c_\beta (4 \delta Z_e + \delta Z_{AA} + \delta Z_{G^-G^-})) \right) - \\ \frac{M_W^2 s_{2\beta}}{2} \left(\delta Z_{1,s2}^{\tilde{d},j_2} U_{1,2}^{\tilde{d},j_2*} + \delta Z_{2,s2}^{\tilde{d},j_2} U_{2,2}^{\tilde{d},j_2*} \right) \end{array} \right\} \end{array} \right\} \end{aligned} \right\} \right] - \\ \left. \left. \left. \delta \text{CKM}_{j_1,j_2} M_W^2 s_{2\beta} s_W \left(m_{d_2} m_{u_1} U_{s1,2}^{\tilde{u},j_1} U_{s2,2}^{\tilde{d},j_2*} - U_{s1,1}^{\tilde{u},j_1} U_{s2,1}^{\tilde{d},j_2*} \left(\frac{M_W^2 s_{2\beta}^2}{2} - c_\beta^2 m_{u_1}^2 - m_{d_2}^2 s_\beta^2 \right) \right) \right) \right] \right\} \right\} - \end{aligned}$$

$$C_{328}(H^0, H^-, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2, \dagger}) = \frac{\sqrt{2}ie^2}{M_W^4 s_{2\beta}^3 s_W^3}$$

[illegible]

$$C_{329}(H^0, G^-, \tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = \frac{\sqrt{2}ie^2}{M_W^4 s_{2\beta}^3 s_W^3}$$

$$\text{CKM}_{j1,j2}^*$$

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$$C_{331}(H^0, G^+, \tilde{a}_{j_2}^{s_2}, \tilde{u}_{j_1}^{s_1, \dagger}) = \frac{\sqrt{2}ie^2}{M_W^4 s_{2\beta}^3 s_W^3}$$

[illegible]

$$C(H^-, H^+, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}) = -\frac{\mathrm{i}e^2}{3c_W^4 M_W^4 s_{2\beta}^3 s_W^3} \left\{ \begin{array}{l} c_\beta \left\{ \begin{array}{l} 2c_\beta^2 \delta_{j1,j2} U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{array}{l} c_W^2 M_W^2 s_\beta s_W \left(3c_\beta^2 c_W^2 m_{u_1}^2 - 2c_{2\beta} M_W^2 s_\beta^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j2} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j2} \right) - \\ 4M_W^4 s_\beta^3 s_W^3 \left(c_W^2 s_{2\beta} \left(\delta Z_{G-H^-} + \delta Z_{G-H^-}^* \right) + c_{2\beta} \left(4\delta s_W s_W + c_W^2 \left(\delta \bar{Z}_{H-H^-} + 4\delta Z_e + \delta Z_{H-H^-} \right) \right) \right) + \\ \frac{U_{s2,2}^{\tilde{u},j2}}{2} \left\{ \begin{array}{l} m_{u_1}^2 M_W^2 s_W \left(24c_\beta^2 \delta s_\beta - 3s_{2\beta} s_\beta \left(\delta Z_{G-H^-} + \delta Z_{G-H^-}^* \right) \right) - \\ c_W^4 \left\{ \begin{array}{l} 4\delta m_{j1}^u M_W^2 s_W - \\ 3c_\beta m_{u_1} s_{2\beta} \left\{ \begin{array}{l} 4\delta s_W M_W^2 + \\ m_{u_1} \left\{ \begin{array}{l} 4\delta s_W M_W^2 + \\ s_W \left(2\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{H-H^-} + 4\delta Z_e + \delta Z_{H-H^-} \right) \right) \end{array} \right\} \end{array} \right\} \end{array} \right\} \end{array} \right\} \\ c_W^2 M_W^2 s_\beta s_W \left\{ \begin{array}{l} s_\beta^2 U_{s2,1}^{\tilde{u},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \left\{ \begin{array}{l} c_{2\beta} c_\beta^2 \delta_{j1,j2} M_W^2 \left(1 + 2c_W^2 \right) + \\ 6c_W^2 s_\beta^2 \left\{ \begin{array}{l} m_{d_1}^2 \text{CKM}_{j1,1}^* \text{CKM}_{j2,1} + m_{d_2}^2 \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} + \\ m_{d_3}^2 \text{CKM}_{j1,3}^* \text{CKM}_{j2,3} \end{array} \right\} \end{array} \right\} + \\ \delta_{j1,j2} U_{s2,2}^{\tilde{u},j2} \left(6c_\beta^4 c_W^2 m_{u_1}^2 - c_{2\beta} M_W^2 s_{2\beta}^2 s_W^2 \right) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \end{array} \right\} \\ c_W^2 M_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j2} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j2} \right) \left\{ \begin{array}{l} c_{2\beta} c_\beta^3 \delta_{j1,j2} M_W^2 \left(1 + 2c_W^2 \right) + \\ 3c_W^2 s_{2\beta} s_\beta \left\{ \begin{array}{l} m_{d_1}^2 \text{CKM}_{j1,1}^* \text{CKM}_{j2,1} + m_{d_2}^2 \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} + \\ m_{d_3}^2 \text{CKM}_{j1,3}^* \text{CKM}_{j2,3} \end{array} \right\} \end{array} \right\} + \\ c_\beta^3 \delta_{j1,j2} M_W^4 \left\{ \begin{array}{l} c_W^2 s_{2\beta} s_W \left(1 + 2c_W^2 \right) \left(\delta Z_{G-H^-} + \delta Z_{G-H^-}^* \right) + \\ c_{2\beta} \left\{ \begin{array}{l} 4\delta s_W s_W^2 - c_W^4 \left(8\delta s_W - 2s_W \left(\delta \bar{Z}_{H-H^-} + 4\delta Z_e + \delta Z_{H-H^-} \right) \right) - \\ c_W^2 \left(4\delta s_W - s_W \left(\delta \bar{Z}_{H-H^-} + 4\delta Z_e + \delta Z_{H-H^-} \right) \right) \end{array} \right\} \end{array} \right\} + \\ \frac{m_{d_3}^2 s_W}{2} \left\{ \begin{array}{l} 2\delta \text{CKM}_{j2,3} M_W^2 \text{CKM}_{j1,3}^* s_{2\beta} + \\ \text{CKM}_{j2,3} \left\{ \begin{array}{l} 2\delta \text{CKM}_{j1,3}^* M_W^2 s_{2\beta} - \\ \text{CKM}_{j1,3}^* \left\{ \begin{array}{l} s_{2\beta} \left(2\delta M_W^2 - M_W^2 \left(\delta \bar{Z}_{H-H^-} + 4\delta Z_e + \delta Z_{H-H^-} \right) \right) + \\ M_W^2 \left(8\delta c_\beta s_\beta + 2c_\beta^2 \left(\delta Z_{G-H^-} + \delta Z_{G-H^-}^* \right) \right) \end{array} \right\} \end{array} \right\} \end{array} \right\} + \\ m_{d_1} \text{CKM}_{j2,1} \left\{ \begin{array}{l} \delta \text{CKM}_{j1,1}^* m_{d_1} M_W^2 s_{2\beta} s_W + \\ 2\delta m_1^d M_W^2 s_{2\beta} s_W - \\ M_W^2 s_W \left(8\delta c_\beta s_\beta + 2c_\beta^2 \left(\delta Z_{G-H^-} + \delta Z_{G-H^-}^* \right) \right) + \\ 4\delta s_W M_W^2 + \\ 2\delta M_W^2 - \\ s_{2\beta} \left\{ \begin{array}{l} 2\delta M_W^2 - \\ s_W \left\{ \begin{array}{l} 4\delta Z_e + \\ M_W^2 \left\{ \begin{array}{l} \delta \bar{Z}_{H-H^-} + \\ \delta Z_{H-H^-} \end{array} \right\} \end{array} \right\} \end{array} \right\} \end{array} \right\} \end{array} \right\} + \\ s_{2\beta} \left\{ \begin{array}{l} \delta \text{CKM}_{j2,1} m_{d_1}^2 M_W^2 \text{CKM}_{j1,1}^* s_W + \\ m_{d_2} \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} \left(2\delta m_2^d M_W^2 s_W - m_{d_2} \left(2\delta s_W M_W^2 + \delta M_W^2 s_W \right) \right) \\ 2\delta \text{CKM}_{j1,2}^* s_{2\beta} - \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C_{345}(G^-, G^+, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2, \dagger}) = -\frac{\mathrm{i} e^2}{12 c_W^4 M_W^4 s_{2\beta} s_W^3}$$

$$\begin{aligned}
& \left\{ c_\beta \left\{ 2 \delta_{j1,j2} U_{s1,2}^{\tilde{u},j1*} \left\{ U_{s2,2}^{\tilde{u},j2} \left\{ 3 c_W^4 m_{u_1}^2 \left\{ s_W \left\{ M_W^2 \left\{ \begin{aligned} & 4 \delta s_W M_W^2 s_\beta + \\ & 2 \delta M_W^2 s_\beta + \\ & 4 \delta s_\beta - c_\beta (\delta Z_{G-H^-} + \delta Z_{H-G^-}) - \\ & 2 s_\beta (2 \delta Z_e + \delta Z_{G-G^-}) \end{aligned} \right\} \right\} \right\} \right\} - \right\} \right\} - \\ & c_W^2 M_W^2 s_\beta s_W \left\{ U_{s2,1}^{\tilde{u},j2} (\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*}) \left\{ c_{2\beta} \delta_{j1,j2} M_W^2 (1 + 2 c_W^2) - \right. \right. \\ & \left. \left. 6 c_W^2 \left\{ \begin{aligned} & m_{d_1}^2 \text{CKM}_{j1,1}^* \text{CKM}_{j2,1} + m_{d_2}^2 \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} + \\ & m_{d_3}^2 \text{CKM}_{j1,3}^* \text{CKM}_{j2,3} \end{aligned} \right\} \right\} - \right. \\ & \left. 2 \delta_{j1,j2} U_{s2,2}^{\tilde{u},j2} (3 c_W^2 m_{u_1}^2 + 2 c_{2\beta} M_W^2 s_W^2) (\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*}) \right\} \right\} - \\ & c_\beta c_W^2 M_W^2 s_W (\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j2} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j2}) \left\{ c_{2\beta} \delta_{j1,j2} M_W^2 (1 + 2 c_W^2) - \right. \\ & \left. 6 c_W^2 \left\{ \begin{aligned} & m_{d_1}^2 \text{CKM}_{j1,1}^* \text{CKM}_{j2,1} + m_{d_2}^2 \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} + \\ & m_{d_3}^2 \text{CKM}_{j1,3}^* \text{CKM}_{j2,3} \end{aligned} \right\} \right\} - \\ & c_\beta \delta_{j1,j2} M_W^4 \left\{ \frac{c_W^2 s_{2\beta} s_W}{2} (1 + 2 c_W^2) (\delta Z_{G-H^-} + \delta Z_{H-G^-}) - \right. \\ & \left. c_{2\beta} \left\{ \begin{aligned} & 2 \delta s_W s_W^2 - c_W^4 (4 \delta s_W - 2 s_W (2 \delta Z_e + \delta Z_{G-G^-})) - \\ & c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{G-G^-})) \end{aligned} \right\} \right\} + \\ & m_{d_3}^2 s_W \left\{ \text{CKM}_{j2,3} (2 c_\beta \delta \text{CKM}_{j1,3}^* M_W^2 - \text{CKM}_{j1,3}^* (2 c_\beta \delta M_W^2 + 4 M_W^2 (\delta c_\beta - c_\beta \delta Z_e))) + \right. \\ & \left. M_W^2 \text{CKM}_{j1,3}^* \left\{ \begin{aligned} & 2 c_\beta \delta \text{CKM}_{j2,3} + \\ & \text{CKM}_{j2,3} (2 c_\beta \delta Z_{G-G^-} - s_\beta (\delta Z_{G-H^-} + \delta Z_{H-G^-})) \end{aligned} \right\} \right\} + \\ & m_{d_1} \text{CKM}_{j2,1} \left\{ \text{CKM}_{j1,1}^* \left\{ \begin{aligned} & 2 c_\beta \delta \text{CKM}_{j1,1}^* m_{d_1} M_W^2 s_W + \\ & 4 c_\beta \delta m_1^d M_W^2 s_W - \\ & M_W^2 s_W (4 \delta c_\beta + s_\beta (\delta Z_{G-H^-} + \delta Z_{H-G^-})) + \\ & c_\beta \left\{ \begin{aligned} & 4 \delta s_W M_W^2 + \\ & 2 s_W (\delta M_W^2 - M_W^2 (2 \delta Z_e + \delta Z_{G-G^-})) \end{aligned} \right\} \end{aligned} \right\} \right\} + \\ & 2 c_\beta \left\{ \begin{aligned} & \delta \text{CKM}_{j2,1} m_{d_1}^2 M_W^2 \text{CKM}_{j1,1}^* s_W + \\ & m_{d_2} \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} (2 \delta m_2^d M_W^2 s_W - m_{d_2} (2 \delta s_W M_W^2 + \delta M_W^2 s_W)) \end{aligned} \right\} + \\ & M_W^2 \left\{ \begin{aligned} & m_{d_2}^2 \text{CKM}_{j2,2} s_W \left\{ \begin{aligned} & 2 c_\beta \delta \text{CKM}_{j1,2}^* - \\ & \text{CKM}_{j1,2}^* \left\{ \begin{aligned} & 4 \delta c_\beta + s_\beta (\delta Z_{G-H^-} + \delta Z_{H-G^-}) - \\ & 2 c_\beta (2 \delta Z_e + \delta Z_{G-G^-}) \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\} \right\}
\end{aligned}$$

$$C(H^-, G^+, \tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}) = -\frac{\mathrm{i} e^2}{3 c_W^4 M_W^4 s_{2\beta}^2 s_W^3} \left\{ \begin{aligned} & c_\beta \left\{ \frac{c_\beta \delta_{j1,j2} U_{s1,2}^{\tilde{u},j1*}}{2} \left\{ \begin{aligned} & c_W^2 M_W^2 s_{2\beta} s_W \left(3 c_W^2 m_{uj1}^2 - 4 M_W^2 s_\beta^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j2} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j2} \right) - \right. \\ & 3 c_W^4 m_{uj1}^2 \left\{ \begin{aligned} & 4 \delta s_W M_W^2 s_{2\beta} + \\ & s_W \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\beta} + \\ & M_W^2 \left\{ \begin{aligned} & 8 c_\beta \delta s_\beta - 2 \delta Z_{G^- H^-} - \\ & s_{2\beta} (4 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\} + \\ & c_W^2 M_W^2 s_\beta s_W \left\{ \begin{aligned} & s_\beta^2 U_{s2,1}^{\tilde{u},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \left\{ \begin{aligned} & c_\beta^2 \delta_{j1,j2} M_W^2 (1 + 2 c_W^2) - \\ & 3 c_W^2 \left\{ \begin{aligned} & m_{d1}^2 \text{CKM}_{j1,1}^* \text{CKM}_{j2,1} + m_{d2}^2 \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} + \\ & m_{d3}^2 \text{CKM}_{j1,3}^* \text{CKM}_{j2,3} \end{aligned} \right\} \end{aligned} \right\} + \\ & \delta_{j1,j2} U_{s2,2}^{\tilde{u},j2} \left(3 c_\beta^2 c_W^2 m_{uj1}^2 - M_W^2 s_{2\beta}^2 s_W^2 \right) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} \end{aligned} \right\} \\ & s_\beta^2 U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & \frac{c_W^2 M_W^2 s_{2\beta} s_W}{2} \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j2} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j2} \right) \left\{ \begin{aligned} & c_\beta^2 \delta_{j1,j2} M_W^2 (1 + 2 c_W^2) - \\ & 3 c_W^2 \left\{ \begin{aligned} & m_{d1}^2 \text{CKM}_{j1,1}^* \text{CKM}_{j2,1} + m_{d2}^2 \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} + \\ & m_{d3}^2 \text{CKM}_{j1,3}^* \text{CKM}_{j2,3} \end{aligned} \right\} \end{aligned} \right\} + \\ & \frac{c_\beta^2 \delta_{j1,j2} M_W^4 s_{2\beta}}{2} \left\{ \begin{aligned} & 4 \delta s_W s_W^2 - c_W^4 (8 \delta s_W - 2 s_W (4 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-})) - \\ & c_W^2 (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-})) \end{aligned} \right\} - \\ & m_{d3}^2 s_W \left\{ \begin{aligned} & \delta \text{CKM}_{j2,3} M_W^2 \text{CKM}_{j1,3}^* s_{2\beta} + \\ & \frac{\text{CKM}_{j2,3}}{2} \left\{ \begin{aligned} & 2 \delta \text{CKM}_{j1,3}^* M_W^2 s_{2\beta} - \\ & \text{CKM}_{j1,3}^* \left\{ \begin{aligned} & 2 \delta M_W^2 s_{2\beta} + \\ & M_W^2 \left\{ \begin{aligned} & 2 \delta Z_{G^- H^-} + 8 \delta c_\beta s_\beta - \\ & s_{2\beta} (4 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & m_{d1} \text{CKM}_{j2,1} \left\{ \begin{aligned} & \delta \text{CKM}_{j1,1}^* m_{d1} M_W^2 s_{2\beta} s_W + \\ & 2 \delta m_1^d M_W^2 s_{2\beta} s_W - \\ & M_W^2 s_W (\delta Z_{G^- H^-} + 4 \delta c_\beta s_\beta) + \\ & 4 \delta s_W M_W^2 + \\ & \frac{s_{2\beta}}{2} \left\{ \begin{aligned} & 2 \delta M_W^2 - \\ & s_W \left\{ \begin{aligned} & 4 \delta Z_e + \\ & M_W^2 \left\{ \begin{aligned} & \delta Z_{H^- H^-} + \\ & \delta Z_{G^- G^-} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & s_{2\beta} \left\{ \begin{aligned} & \delta \text{CKM}_{j2,1} m_{d1}^2 M_W^2 \text{CKM}_{j1,1}^* s_W + \\ & m_{d2} \text{CKM}_{j1,2}^* \text{CKM}_{j2,2} (2 \delta m_2^d M_W^2 s_W - m_{d2} (2 \delta s_W M_W^2 + \delta M_W^2 s_W)) \end{aligned} \right\} + \end{aligned} \right\} \end{aligned} \right\} \end{aligned}$$

$$C(H^-, H^+, \tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = -\frac{\mathrm{i} e^2}{3 c_W^4 M_W^4 s_{2\beta}^3 s_W^3} \left\{ \begin{aligned} & s_\beta \left\{ \begin{aligned} & 2 \delta_{j1,j2} s_\beta^2 U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & c_\beta c_W^2 M_W^2 s_W \left(3 c_W^2 m_{d_1}^2 s_\beta^2 + c_{2\beta} c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2} \right) + \\ & 2 c_\beta^3 M_W^4 s_W^3 \left(c_W^2 s_{2\beta} (\delta Z_{G-H-} + \delta Z_{G-H-}^*) + c_{2\beta} (4 \delta s_W s_W + c_W^2 (\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{H-H-})) \right) - \\ & \frac{U_{s2,2}^{\tilde{d},j2}}{2} \left\{ \begin{aligned} & c_W^4 \left\{ \begin{aligned} & m_{d_1}^2 M_W^2 s_W \left(24 \delta c_\beta s_\beta^2 + 3 c_\beta s_{2\beta} (\delta Z_{G-H-} + \delta Z_{G-H-}^*) \right) - \\ & 3 m_{d_1} s_{2\beta} s_\beta \left\{ \begin{aligned} & 4 \delta m_{j1}^d M_W^2 s_W - \\ & m_{d_1} \left\{ \begin{aligned} & 4 \delta s_W M_W^2 + \\ & s_W (2 \delta M_W^2 - M_W^2 (\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{H-H-})) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & c_\beta^2 U_{s2,1}^{\tilde{d},j2} (\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*}) \left\{ \begin{aligned} & c_{2\beta} \delta_{j1,j2} M_W^2 s_\beta^2 (1 - 4 c_W^2) + \\ & 6 c_\beta^2 c_W^2 \left\{ \begin{aligned} & m_{u_1}^2 \text{CKM}_{1,j1} \text{CKM}_{1,j2}^* + m_{u_2}^2 \text{CKM}_{2,j1} \text{CKM}_{2,j2}^* + \\ & m_{u_3}^2 \text{CKM}_{3,j1} \text{CKM}_{3,j2}^* \end{aligned} \right\} \end{aligned} \right\} + \\ & \frac{\delta_{j1,j2} U_{s2,2}^{\tilde{d},j2}}{2} (12 c_W^2 m_{d_1}^2 s_\beta^4 + c_{2\beta} M_W^2 s_{2\beta}^2 s_W^2) (\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*}) \end{aligned} \right\} \end{aligned} \right\} \\ & c_W^2 M_W^2 s_\beta s_W (\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2}) \left\{ \begin{aligned} & c_{2\beta} \delta_{j1,j2} M_W^2 s_\beta^2 (1 - 4 c_W^2) + \\ & 6 c_\beta^2 c_W^2 \left\{ \begin{aligned} & m_{u_1}^2 \text{CKM}_{1,j1} \text{CKM}_{1,j2}^* + m_{u_2}^2 \text{CKM}_{2,j1} \text{CKM}_{2,j2}^* + \\ & m_{u_3}^2 \text{CKM}_{3,j1} \text{CKM}_{3,j2}^* \end{aligned} \right\} \end{aligned} \right\} + \\ & \delta_{j1,j2} M_W^4 s_\beta^3 \left\{ \begin{aligned} & c_W^2 s_{2\beta} s_W (1 - 4 c_W^2) (\delta Z_{G-H-} + \delta Z_{G-H-}^*) - \\ & c_{2\beta} \left\{ \begin{aligned} & c_W^2 (4 \delta s_W - s_W (\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{H-H-})) - \\ & 4 (\delta s_W s_W^2 + c_W^4 (4 \delta s_W - s_W (\delta \bar{Z}_{H-H-} + 4 \delta Z_e + \delta Z_{H-H-}))) \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta^3 U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & m_{u_1} \text{CKM}_{1,j1} \left\{ \begin{aligned} & \delta \text{CKM}_{1,j2}^* m_{u_1} M_W^2 s_{2\beta} s_W + \\ & 2 \delta m_1^u M_W^2 s_{2\beta} s_W - \\ & M_W^2 s_W (8 c_\beta \delta s_\beta - 2 s_\beta^2 (\delta Z_{G-H-} + \delta Z_{G-H-}^*)) + \\ & s_{2\beta} \left\{ \begin{aligned} & 4 \delta s_W M_W^2 + \\ & s_W \left\{ \begin{aligned} & 2 \delta M_W^2 - \\ & M_W^2 \left\{ \begin{aligned} & 4 \delta Z_e + \\ & \delta \bar{Z}_{H-H-} + \\ & \delta Z_{H-H-} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & 6 c_\beta c_W^4 \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & \delta \text{CKM}_{1,j1} m_{u_1}^2 M_W^2 \text{CKM}_{1,j2}^* s_{2\beta} + \\ & \text{CKM}_{3,j1} s_{2\beta} (\delta \text{CKM}_{3,j2}^* M_W^2 - \text{CKM}_{3,j2}^* (\delta M_W^2 - 2 \delta Z_e M_W^2)) + \\ & m_{u_3}^2 \left\{ \begin{aligned} & \frac{M_W^2 \text{CKM}_{3,j2}^*}{2} \left\{ \begin{aligned} & 2 \delta \text{CKM}_{3,j1} s_{2\beta} + \\ & \text{CKM}_{3,j1} \left\{ \begin{aligned} & s_{2\beta} (\delta \bar{Z}_{H-H-} + \delta Z_{H-H-}) + \\ & 2 s_\beta^2 (\delta Z_{G-H-} + \delta Z_{G-H-}^*) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & c_\beta m_{u_2} \text{CKM}_{2,j1} \left\{ \begin{aligned} & m_{u_2} s_\beta s_W (2 \delta \text{CKM}_{2,j2}^* M_W^2 - 2 \text{CKM}_{2,j2}^* (\delta M_W^2 - 2 \delta Z_e M_W^2)) + \\ & 4 M_W^2 \text{CKM}_{2,j2}^* (\delta m_2^u s_\beta s_W - m_{u_2} (\delta s_W s_\beta + \delta s_\beta s_W)) \end{aligned} \right\} - \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned}$$

$$C_{349}(G^-, G^+, \tilde{a}_{j1}^{s1}, \tilde{a}_{j2}^{s2, \dagger}) = -\frac{\mathrm{i} e^2}{12 c_W^4 M_W^4 s_{2\beta} s_W^3}$$

[illegible]

$$C(H^-, G^+, \tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}) = \frac{i e^2}{3 c_W^4 M_W^4 s_{2\beta}^2 s_W^3}$$

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$$C(G^-, H^+, \tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2, \dagger}) = \frac{\mathbf{i} e^2}{6 c_W^4 M_W^4 s_{2\beta}^2 s_W^3}$$

$$\left\{ \begin{array}{l} 2 s_\beta \left\{ \begin{array}{l} \delta_{j1,j2} s_\beta U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{array}{l} \frac{c_W^2 M_W^2 s_{2\beta} s_W}{2} \left(3 c_W^2 m_{d1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2} \right) + \\ \frac{3 c_W^4 m_{d1}}{2} \left\{ \begin{array}{l} 4 \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \\ 4 \delta s_W M_W^2 s_{2\beta} + \\ 2 \delta M_W^2 s_{2\beta} + \\ M_W^2 \left\{ \begin{array}{l} 8 \delta c_\beta s_\beta + 2 \delta Z_{H-G^-} s_\beta^2 - \\ s_{2\beta} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-}) \end{array} \right\} \end{array} \right\} - \\ c_\beta^2 \left\{ \begin{array}{l} c_W^2 \delta Z_{G^-H^-}^* M_W^2 s_W \left(3 c_W^2 m_{d1}^2 - c_{2\beta} M_W^2 s_W^2 \right) + \\ M_W^4 s_W^3 \left\{ \begin{array}{l} 4 \delta s_W s_{2\beta} s_W + \\ c_W^2 (c_{2\beta} \delta Z_{H-G^-} + s_{2\beta} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-})) \end{array} \right\} \end{array} \right\} \end{array} \right\} - \\ c_\beta c_W^2 M_W^2 s_W \left\{ \begin{array}{l} c_\beta^2 U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) \left\{ \begin{array}{l} \delta_{j1,j2} M_W^2 s_\beta^2 (1 - 4 c_W^2) + \\ 3 c_W^2 \left\{ \begin{array}{l} m_{u1}^2 \text{CKM}_{1,j1} \text{CKM}_{1,j2}^* + m_{u2}^2 \text{CKM}_{2,j1} \text{CKM}_{2,j2}^* + \\ m_{u3}^2 \text{CKM}_{3,j1} \text{CKM}_{3,j2}^* \end{array} \right\} \end{array} \right\} - \\ \delta_{j1,j2} s_\beta^2 U_{s2,2}^{\tilde{d},j2} \left(3 c_W^2 m_{d1}^2 - 2 c_\beta^2 M_W^2 s_W^2 \right) \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) \end{array} \right\} - \\ c_W^2 M_W^2 s_{2\beta} s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) \left\{ \begin{array}{l} \delta_{j1,j2} M_W^2 s_\beta^2 (1 - 4 c_W^2) + \\ 3 c_W^2 \left\{ \begin{array}{l} m_{u1}^2 \text{CKM}_{1,j1} \text{CKM}_{1,j2}^* + m_{u2}^2 \text{CKM}_{2,j1} \text{CKM}_{2,j2}^* + \\ m_{u3}^2 \text{CKM}_{3,j1} \text{CKM}_{3,j2}^* \end{array} \right\} \end{array} \right\} - \\ \delta_{j1,j2} M_W^4 s_\beta^2 \left\{ \begin{array}{l} c_{2\beta} c_W^2 s_W (1 - 4 c_W^2) (\delta Z_{G^-H^-}^* - \delta Z_{H-G^-}) + \\ c_W^2 (4 \delta s_W - s_W (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-})) - \\ 4 (\delta s_W s_W^2 + c_W^4 (4 \delta s_W - s_W (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + \delta Z_{G-G^-}))) \end{array} \right\} - \\ m_{u1} \text{CKM}_{1,j1} \left\{ \begin{array}{l} \delta \text{CKM}_{1,j2}^* m_{u1} M_W^2 s_{2\beta} s_W + \\ 2 \delta m_1^u M_W^2 s_{2\beta} s_W + \\ \delta Z_{G^-H^-}^* M_W^2 s_\beta^2 s_W - \\ 4 \delta s_W M_W^2 s_\beta + \\ 2 \delta M_W^2 s_\beta + \\ 4 \delta s_\beta - \\ c_\beta \delta Z_{H-G^-} - \\ M_W^2 \left\{ \begin{array}{l} 4 \delta s_\beta - \\ c_\beta \delta Z_{H-G^-} - \\ s_\beta \left\{ \begin{array}{l} 4 \delta Z_e + \\ \delta \bar{Z}_{H-H^-} + \\ \delta Z_{G-G^-} \end{array} \right\} \end{array} \right\} \end{array} \right\} + \\ \delta \text{CKM}_{1,j1} m_{u1}^2 M_W^2 \text{CKM}_{1,j2}^* s_{2\beta} + \\ \text{CKM}_{3,j1} s_{2\beta} \left(\delta \text{CKM}_{3,j2}^* M_W^2 - \text{CKM}_{3,j2}^* (\delta M_W^2 - 2 \delta Z_e M_W^2) \right) + \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$\begin{aligned}
C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, \tilde{e}_{j3}^{s3}, \tilde{e}_{j4}^{s4,\dagger}) = & -\frac{i e^2 \delta_{j1,j2} \delta_{j3,j4}}{24 c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ \right. \\
& 2 U_{s3,2}^{\tilde{e},j3*} \left\{ \right. \\
& c_\beta M_W^2 s_W \left\{ \right. \\
& 2 c_\beta^2 M_W^2 s_W^2 U_{s1,2}^{\tilde{d},j1*} \left\{ c_W^2 U_{s4,2}^{\tilde{e},j3} \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} \right) + \right. \\
& U_{s2,2}^{\tilde{d},j1} \left(4 U_{s4,2}^{\tilde{e},j3} \left(c_W^2 \delta Z_e + \delta s_W s_W \right) + c_W^2 \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,2}^{\tilde{e},j3} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,2}^{\tilde{e},j3} \right) \right) \left. \right\} + \\
& c_W^2 \left\{ \right. \\
& 2 c_\beta^2 M_W^2 s_W^2 U_{s2,2}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) + \\
& \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) \left(3 c_W^2 m_{d_1} m_{e_3} U_{s2,2}^{\tilde{e},j3} U_{s4,1}^{\tilde{e},j3} + c_\beta^2 M_W^2 s_W^2 U_{s2,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) \left. \right\} + \\
& \left. \left\{ \right. \\
& \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left(3 c_\beta c_W^4 m_{d_1} m_{e_3} M_W^2 s_W U_{1,2}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} + c_\beta^3 c_W^2 M_W^4 s_W^3 U_{1,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) + \\
& \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left(3 c_\beta c_W^4 m_{d_1} m_{e_3} M_W^2 s_W U_{2,2}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} + c_\beta^3 c_W^2 M_W^4 s_W^3 U_{2,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) + \\
& c_\beta^3 M_W^4 s_W^3 U_{s2,1}^{\tilde{d},j1} \left(4 U_{s4,2}^{\tilde{e},j3} \left(c_W^2 \delta Z_e + \delta s_W s_W \right) + c_W^2 \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,2}^{\tilde{e},j3} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,2}^{\tilde{e},j3} \right) \right) + \\
& c_W^4 U_{s2,2}^{\tilde{d},j1} \left\{ c_\beta \left\{ \right. \right. \\
& M_W^2 s_W \left\{ \right. \\
& 3 m_{d_1} m_{e_3} \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,1}^{\tilde{e},j3} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,1}^{\tilde{e},j3} \right) + \\
& 6 U_{s4,1}^{\tilde{e},j3} \left(\delta m_{j3}^e m_{d_1} + \delta m_{j1}^d m_{e_3} \right) \left. \right\} - \left. \right\} - \\
& 6 m_{d_1} m_{e_3} U_{s4,1}^{\tilde{e},j3} \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \left. \right\} - \\
& 12 m_{d_1} m_{e_3} M_W^2 s_W U_{s4,1}^{\tilde{e},j3} \left(\delta c_\beta - c_\beta \delta Z_e \right) \left. \right\} \left. \right\} - \\
& c_\beta c_W^2 M_W^2 s_W \left\{ \right. \\
& \left(\delta Z_{1,s3}^{\tilde{e},j3} U_{1,1}^{\tilde{e},j3*} + \delta Z_{2,s3}^{\tilde{e},j3} U_{2,1}^{\tilde{e},j3*} \right) \left\{ c_\beta^2 M_W^2 U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} \left(1 - 4 c_W^2 \right) + \right. \\
& 2 U_{s1,2}^{\tilde{d},j1*} \left(c_\beta^2 M_W^2 s_W^2 U_{s2,1}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} - 3 c_W^2 m_{d_1} m_{e_3} U_{s2,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) \left. \right\} - \\
& 2 \left(\delta Z_{1,s3}^{\tilde{e},j3} U_{1,2}^{\tilde{e},j3*} + \delta Z_{2,s3}^{\tilde{e},j3} U_{2,2}^{\tilde{e},j3*} \right) \left(3 c_W^2 m_{d_1} m_{e_3} U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} + c_\beta^2 M_W^2 s_W^2 U_{s4,2}^{\tilde{e},j3} \left(U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} + 2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \right) \right) \left. \right\} - \\
& c_\beta^3 M_W^4 U_{s1,1}^{\tilde{d},j1*} \left\{ \right. \\
& c_W^2 s_W U_{s4,1}^{\tilde{e},j3} \left(1 - 4 c_W^2 \right) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) + \\
& U_{s2,1}^{\tilde{d},j1} \left\{ c_W^2 s_W \left(1 - 4 c_W^2 \right) \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,1}^{\tilde{e},j3} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,1}^{\tilde{e},j3} \right) + \right. \\
& 4 U_{s4,1}^{\tilde{e},j3} \left(c_W^2 \delta Z_e s_W^3 + \delta s_W s_W^4 + 3 c_W^4 \left(\delta s_W - \delta Z_e s_W \right) \right) \left. \right\} \left. \right\} + \\
& c_\beta c_W^2 M_W^2 s_W \left\{ \right. \\
& c_\beta^2 M_W^2 U_{s2,1}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} \left(1 - 4 c_W^2 \right) \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) + \\
& 2 \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) \left(c_\beta^2 M_W^2 s_W^2 U_{s2,2}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} - 3 c_W^2 m_{d_1} m_{e_3} U_{s2,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) \left. \right\} + \\
& U_{s3,1}^{\tilde{e},j3*} \left\{ \right. \\
& \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left(c_\beta^3 c_W^2 M_W^4 s_W^3 U_{1,2}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} - 3 c_\beta c_W^4 m_{d_1} m_{e_3} M_W^2 s_W U_{1,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) + \\
& \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left(c_\beta^3 c_W^2 M_W^4 s_W^3 U_{2,2}^{\tilde{d},j1} U_{s4,1}^{\tilde{e},j3} - 3 c_\beta c_W^4 m_{d_1} m_{e_3} M_W^2 s_W U_{2,1}^{\tilde{d},j1} U_{s4,2}^{\tilde{e},j3} \right) - \\
& 2 U_{s1,2}^{\tilde{d},j1*} \left\{ c_W^4 U_{s2,1}^{\tilde{d},j1} \left\{ c_\beta \left\{ \right. \right. \right. \\
& M_W^2 s_W \left\{ \right. \\
& 3 m_{d_1} m_{e_3} \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,2}^{\tilde{e},j3} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,2}^{\tilde{e},j3} \right) + \\
& 6 U_{s4,2}^{\tilde{e},j3} \left(\delta m_{j3}^e m_{d_1} + \delta m_{j1}^d m_{e_3} \right) \left. \right\} - \left. \right\} - \\
& 6 m_{d_1} m_{e_3} U_{s4,2}^{\tilde{e},j3} \left(2 \delta s_W M_W^2 + \delta M_W^2 s_W \right) \left. \right\} + \\
& 12 m_{d_1} m_{e_3} M_W^2 s_W U_{s4,2}^{\tilde{e},j3} \left(\delta c_\beta - c_\beta \delta Z_e \right) \left. \right\} \left. \right\} + \\
& c_\beta^3 M_W^4 s_W^3 U_{s2,2}^{\tilde{d},j1} \left(4 U_{s4,1}^{\tilde{e},j3} \left(c_W^2 \delta Z_e + \delta s_W s_W \right) + c_W^2 \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,1}^{\tilde{e},j3} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,1}^{\tilde{e},j3} \right) \right) \left. \right\} \left. \right\}
\end{aligned}$$

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$$\begin{aligned}
C(\tilde{e}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, \tilde{u}_{j3}^{s3}, \tilde{\nu}_{j4}^\dagger) = & -\frac{i e^2 \delta_{j1,j4}}{4 c_\beta^3 M_W^4 s_W^3} \left\{ \text{CKM}_{j3,j2}^* \left\{ \begin{aligned} & c_\beta^3 M_W^4 U_{s1,1}^{\tilde{e},j1*} \left\{ U_{s3,1}^{\tilde{u},j3*} \left\{ s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) - \right. \right. \\ & \left. \left. U_{s2,1}^{\tilde{d},j2} \left(4 \delta s_W - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j4} + 4 \delta Z_e \right) \right) \right\} \right\} + \right. \\ & \left. s_W U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s3}^{\tilde{u},j3} U_{1,1}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,1}^{\tilde{u},j3*} \right) \right\} + \\ & U_{s1,2}^{\tilde{e},j1*} \left\{ U_{s3,1}^{\tilde{u},j3*} \left\{ c_\beta m_{d_2} m_{e_1} M_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j2} \right) + \right. \right. \\ & \left. \left. U_{s2,2}^{\tilde{d},j2} \left\{ \begin{aligned} & 2 c_\beta \delta m_{j2}^d m_{e_1} M_W^2 s_W + \\ & 2 c_\beta \delta m_{j1}^e M_W^2 s_W - \\ & m_{d_2} \left\{ m_{e_1} \left\{ c_\beta \left(4 \delta s_W M_W^2 + 2 \delta M_W^2 s_W \right) + \right. \right. \\ & \left. \left. M_W^2 s_W \left(4 \delta c_\beta - c_\beta \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j4} + 4 \delta Z_e \right) \right) \right\} \right\} \right\} \right\} + \\ & c_\beta m_{d_2} m_{e_1} M_W^2 s_W U_{s2,2}^{\tilde{d},j2} \left(\delta Z_{1,s3}^{\tilde{u},j3} U_{1,1}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,1}^{\tilde{u},j3*} \right) \\ & c_\beta M_W^2 s_W U_{s3,1}^{\tilde{u},j3*} \left\{ c_\beta^2 M_W^2 U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) + \right. \\ & \left. m_{d_2} m_{e_1} U_{s2,2}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) \right\} \\ & 2 c_\beta \delta \text{CKM}_{j3,j2}^* M_W^2 s_W U_{s3,1}^{\tilde{u},j3*} \left(c_\beta^2 M_W^2 U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{d},j2} + m_{d_2} m_{e_1} U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{d},j2} \right) \end{aligned} \right\} \right\} + \end{aligned}
\end{aligned}$$

$$\begin{aligned}
C(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, \tilde{u}_{j3}^{s3}, \tilde{u}_{j4}^{s4,\dagger}) = & -\frac{i e^2 \delta_{j1,j2} \delta_{j3,j4}}{24 c_W^4 s_W^3} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & 4 s_W^2 U_{s3,2}^{\tilde{u},j3*} \left\{ \begin{aligned} & c_W^2 U_{s2,1}^{\tilde{e},j1} \left(\delta \bar{Z}_{1,s4}^{\tilde{u},j4} U_{1,2}^{\tilde{u},j3} + \delta \bar{Z}_{2,s4}^{\tilde{u},j4} U_{2,2}^{\tilde{u},j3} \right) + \right. \\ & \left. U_{s4,2}^{\tilde{u},j3} \left(4 U_{s2,1}^{\tilde{e},j1} (c_W^2 \delta Z_e + \delta s_W s_W) + c_W^2 (\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1}) \right) \right\} - \end{aligned} \right\} - \end{aligned} \right\} - \\ & c_W^2 U_{s2,1}^{\tilde{e},j1} \left\{ \begin{aligned} & U_{s4,1}^{\tilde{u},j3} (1 + 2 c_W^2) (\delta Z_{1,s3}^{\tilde{u},j3} U_{1,1}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,1}^{\tilde{u},j3*}) - \end{aligned} \right\} \\ & 4 s_W^2 U_{s4,2}^{\tilde{u},j3} (\delta Z_{1,s3}^{\tilde{u},j3} U_{1,2}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,2}^{\tilde{u},j3*}) \end{aligned} \right\} \\ & U_{s3,1}^{\tilde{u},j3*} \left\{ \begin{aligned} & c_W^2 s_W U_{s2,1}^{\tilde{e},j1} (1 + 2 c_W^2) (\delta \bar{Z}_{1,s4}^{\tilde{u},j4} U_{1,1}^{\tilde{u},j3} + \delta \bar{Z}_{2,s4}^{\tilde{u},j4} U_{2,1}^{\tilde{u},j3}) + \\ & U_{s4,1}^{\tilde{u},j3} \left\{ \begin{aligned} & c_W^2 s_W (1 + 2 c_W^2) (\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1}) + \end{aligned} \right\} \\ & 4 U_{s2,1}^{\tilde{e},j1} (\delta s_W s_W^2 - (c_W^2 + 2 c_W^4) (\delta s_W - \delta Z_e s_W)) \end{aligned} \right\} \end{aligned} \right\} \\ & c_W^2 \left\{ \begin{aligned} & 2 s_W^2 U_{s2,2}^{\tilde{e},j1} (\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*}) (U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - 4 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3}) + \\ & U_{s2,1}^{\tilde{e},j1} (\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*}) (4 s_W^2 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} - U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} (1 + 2 c_W^2)) \end{aligned} \right\} + \\ & s_W \left\{ \begin{aligned} & U_{s3,1}^{\tilde{u},j3*} \left\{ \begin{aligned} & c_W^2 U_{s2,2}^{\tilde{e},j1} (\delta \bar{Z}_{1,s4}^{\tilde{u},j4} U_{1,1}^{\tilde{u},j3} + \delta \bar{Z}_{2,s4}^{\tilde{u},j4} U_{2,1}^{\tilde{u},j3}) + \\ & U_{s4,1}^{\tilde{u},j3} (4 U_{s2,2}^{\tilde{e},j1} (c_W^2 \delta Z_e + \delta s_W s_W) + c_W^2 (\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1})) \end{aligned} \right\} - \\ & 2 s_W^2 U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & 4 U_{s3,2}^{\tilde{u},j3*} \left\{ \begin{aligned} & c_W^2 U_{s2,2}^{\tilde{e},j1} (\delta \bar{Z}_{1,s4}^{\tilde{u},j4} U_{1,2}^{\tilde{u},j3} + \delta \bar{Z}_{2,s4}^{\tilde{u},j4} U_{2,2}^{\tilde{u},j3}) + \\ & U_{s4,2}^{\tilde{u},j3} (4 U_{s2,2}^{\tilde{e},j1} (c_W^2 \delta Z_e + \delta s_W s_W) + c_W^2 (\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1})) \end{aligned} \right\} + \\ & c_W^2 U_{s2,2}^{\tilde{e},j1} \left\{ \begin{aligned} & U_{s4,1}^{\tilde{u},j3} (\delta Z_{1,s3}^{\tilde{u},j3} U_{1,1}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,1}^{\tilde{u},j3*}) - \\ & 4 U_{s4,2}^{\tilde{u},j3} (\delta Z_{1,s3}^{\tilde{u},j3} U_{1,2}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,2}^{\tilde{u},j3*}) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \\ & C(\tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger, \tilde{u}_{j3}^{s3}, \tilde{u}_{j4}^{s4,\dagger}) = -\frac{i e^2 \delta_{j1,j2} \delta_{j3,j4}}{24 c_W^4 s_W^3} \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & 4 s_W^2 U_{s3,2}^{\tilde{u},j3*} \left\{ \begin{aligned} & c_W^2 (\delta \bar{Z}_{1,s4}^{\tilde{u},j4} U_{1,2}^{\tilde{u},j3} + \delta \bar{Z}_{2,s4}^{\tilde{u},j4} U_{2,2}^{\tilde{u},j3}) + \\ & U_{s4,2}^{\tilde{u},j3} (c_W^2 (\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{1,1}^{\tilde{\nu},j1}) + 4 (c_W^2 \delta Z_e + \delta s_W s_W)) \end{aligned} \right\} - \end{aligned} \right\} - \\ & c_W^2 \left\{ \begin{aligned} & U_{s4,1}^{\tilde{u},j3} (1 - 4 c_W^2) (\delta Z_{1,s3}^{\tilde{u},j3} U_{1,1}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,1}^{\tilde{u},j3*}) - \\ & 4 s_W^2 U_{s4,2}^{\tilde{u},j3} (\delta Z_{1,s3}^{\tilde{u},j3} U_{1,2}^{\tilde{u},j3*} + \delta Z_{2,s3}^{\tilde{u},j3} U_{2,2}^{\tilde{u},j3*}) \end{aligned} \right\} \\ & U_{s3,1}^{\tilde{u},j3*} \left\{ \begin{aligned} & c_W^2 s_W (1 - 4 c_W^2) (\delta \bar{Z}_{1,s4}^{\tilde{u},j4} U_{1,1}^{\tilde{u},j3} + \delta \bar{Z}_{2,s4}^{\tilde{u},j4} U_{2,1}^{\tilde{u},j3}) - \\ & U_{s4,1}^{\tilde{u},j3} \left((\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{1,1}^{\tilde{\nu},j1}) (3 c_W^4 s_W - c_W^2 s_W^3) - 4 (c_W^2 \delta Z_e s_W^3 + \delta s_W s_W^4 + 3 c_W^4 (\delta s_W - \delta Z_e s_W)) \right) \end{aligned} \right\} \end{aligned} \right\}
\end{aligned}$$

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$$C(h^0, h^0, h^0, h^0) = -\frac{3ie^2 c_{2\alpha}}{2c_W^4 s_W^3} (c_W^2 \delta Z_{hH} s_{2\alpha} s_W + c_{2\alpha} (\delta s_W s_W^2 - c_W^2 (\delta s_W - s_W (\delta Z_e + \delta Z_{hh}))))$$

$$C(h^0, h^0, h^0, H^0) = -\frac{3ie^2 s_{2\alpha}}{8c_W^4 s_W^3} (2c_W^2 \delta Z_{hH} s_{2\alpha} s_W + c_{2\alpha} (4\delta s_W s_W^2 - c_W^2 (4\delta s_W - s_W (4\delta Z_e + 3\delta Z_{hh} + \delta Z_{HH}))))$$

$$C(h^0, h^0, H^0, H^0) = \frac{ie^2}{4c_W^4 s_W^3} (1 - 3s_{2\alpha}^2) (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{hh} + \delta Z_{HH})))$$

$$C(h^0, H^0, H^0, H^0) = -\frac{3ie^2 s_{2\alpha}}{8c_W^4 s_W^3} (2c_W^2 \delta Z_{hH} s_{2\alpha} s_W - c_{2\alpha} (4\delta s_W s_W^2 - c_W^2 (4\delta s_W - s_W (4\delta Z_e + \delta Z_{hh} + 3\delta Z_{HH}))))$$

$$C(H^0, H^0, H^0, H^0) = \frac{3ie^2 c_{2\alpha}}{2c_W^4 s_W^3} (c_W^2 \delta Z_{hH} s_{2\alpha} s_W - c_{2\alpha} (\delta s_W s_W^2 - c_W^2 (\delta s_W - s_W (\delta Z_e + \delta Z_{HH}))))$$

$$C(h^0, h^0, A^0, A^0) = -\frac{ie^2}{4c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} c_W^2 \delta Z_{hH} s_{2\alpha} s_W + \\ c_{2\alpha} (c_W^2 \delta Z_{AG} s_{2\beta} s_W + c_{2\beta} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{AA} + \delta Z_{hh})))) \end{array} \right\}$$

$$C(h^0, h^0, G^0, G^0) = \frac{ie^2}{4c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} c_W^2 \delta Z_{hH} s_{2\alpha} s_W - \\ c_{2\alpha} (c_W^2 \delta Z_{AG} s_{2\beta} s_W - c_{2\beta} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{GG} + \delta Z_{hh})))) \end{array} \right\}$$

$$C(h^0, h^0, A^0, G^0) = -\frac{ie^2 s_{2\beta}}{8c_W^4 s_W^3} (2c_W^2 \delta Z_{hH} s_{2\alpha} s_W + c_{2\alpha} (4\delta s_W s_W^2 - c_W^2 (4\delta s_W - s_W (4\delta Z_e + \delta Z_{AA} + \delta Z_{GG} + 2\delta Z_{hh}))))$$

$$C(h^0, H^0, A^0, A^0) = -\frac{ie^2 s_{2\alpha}}{8c_W^4 s_W^3} (2c_W^2 \delta Z_{AG} s_{2\beta} s_W + c_{2\beta} (4\delta s_W s_W^2 - c_W^2 (4\delta s_W - s_W (4\delta Z_e + 2\delta Z_{AA} + \delta Z_{hh} + \delta Z_{HH}))))$$

$$C(h^0, H^0, G^0, G^0) = -\frac{ie^2 s_{2\alpha}}{8c_W^4 s_W^3} (2c_W^2 \delta Z_{AG} s_{2\beta} s_W - c_{2\beta} (4\delta s_W s_W^2 - c_W^2 (4\delta s_W - s_W (4\delta Z_e + 2\delta Z_{GG} + \delta Z_{hh} + \delta Z_{HH}))))$$

$$C(h^0, H^0, A^0, G^0) = -\frac{ie^2 s_{2\alpha} s_{2\beta}}{8c_W^4 s_W^3} (4\delta s_W s_W^2 - c_W^2 (4\delta s_W - s_W (4\delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{hh} + \delta Z_{HH})))$$

$$C_{102}(H^0, H^0, A^0, A^0) = -\frac{i e^2}{4 c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} (c_W^2 \delta Z_{hH} s_{2\alpha} s_W - c_{2\alpha} (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{AA} + \delta Z_{HH})))) - \\ c_{2\alpha} c_W^2 \delta Z_{AG} s_{2\beta} s_W \end{array} \right\}$$

$$C_{103}(H^0, H^0, G^0, G^0) = \frac{i e^2}{4 c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} c_W^2 \delta Z_{hH} s_{2\alpha} s_W + \\ c_{2\alpha} (c_W^2 \delta Z_{AG} s_{2\beta} s_W - c_{2\beta} (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{GG} + \delta Z_{HH})))) \end{array} \right\}$$

$$C_{104}(H^0, H^0, A^0, G^0) = -\frac{i e^2 s_{2\beta}}{8 c_W^4 s_W^3} (2 c_W^2 \delta Z_{hH} s_{2\alpha} s_W - c_{2\alpha} (4 \delta s_W s_W^2 - c_W^2 (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + 2 \delta Z_{HH}))))$$

$$C_{105}(h^0, h^0, H^-, H^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} (4 c_{2\alpha} \delta s_W s_W^4 + c_W^2 s_W^3 (2 \delta Z_{hH} s_{2\alpha} + c_{2\alpha} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{H-H^-}))) + \\ 2 Re(\delta Z_{G-H^-}) c_W^2 s_W (c_{2\beta} c_W^2 s_{2\alpha} + c_{2\alpha} s_{2\beta} s_W^2) - \\ c_W^4 \left\{ \begin{array}{l} 4 \delta s_W (1 - s_{2\alpha} s_{2\beta}) - \\ s_W \left\{ \begin{array}{l} \delta \bar{Z}_{H-H^-} + 4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{H-H^-} + \\ s_{2\beta} (2 c_{2\alpha} \delta Z_{hH} - s_{2\alpha} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{H-H^-})) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C_{106}(h^0, h^0, G^-, G^+) = \frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{array}{l} 4 c_{2\alpha} c_{2\beta} \delta s_W s_W^4 + \\ c_W^2 s_W^3 (2 c_{2\beta} \delta Z_{hH} s_{2\alpha} - c_{2\alpha} (s_{2\beta} (\delta Z_{G-H^-} + \delta Z_{H-G^-}) - 2 c_{2\beta} (2 \delta Z_e + \delta Z_{hh} + \delta Z_{G-G^-}))) + \\ c_W^4 \left\{ \begin{array}{l} 4 \delta s_W (1 + s_{2\alpha} s_{2\beta}) - \\ s_W \left\{ \begin{array}{l} 4 \delta Z_e (1 + s_{2\alpha} s_{2\beta}) + c_{2\beta} s_{2\alpha} (\delta Z_{G-H^-} + \delta Z_{H-G^-}) + \\ 2 (\delta Z_{hh} + \delta Z_{G-G^-} - s_{2\beta} (c_{2\alpha} \delta Z_{hH} - s_{2\alpha} (\delta Z_{hh} + \delta Z_{G-G^-}))) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C_{107}(h^0, h^0, H^-, G^+) = \frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} c_W^4 (4 \delta s_W s_{2\alpha} + s_W (2 c_{2\alpha} \delta Z_{hH} - s_{2\alpha} (4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{G-G^-} + \delta Z_{H-H^-}))) - \\ s_W \left\{ \begin{array}{l} 2 c_W^4 \delta Z_{G-H^-} + \\ s_{2\beta} s_W^2 (2 c_W^2 \delta Z_{hH} s_{2\alpha} + c_{2\alpha} (4 \delta s_W s_W + c_W^2 (4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{G-G^-} + \delta Z_{H-H^-}))) \end{array} \right\} \end{array} \right\}$$

$$C_{108}(h^0, h^0, G^-, H^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} \left\{ \begin{array}{l} c_{2\alpha} c_W^2 \delta Z_{H-G^-} s_W^3 - \\ c_W^4 (4 \delta s_W s_{2\alpha} + s_W (2 c_{2\alpha} \delta Z_{hH} - s_{2\alpha} (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{G-G^-}))) \end{array} \right\} + \\ s_W \left\{ \begin{array}{l} c_W^2 (2 \delta Z_{hH} s_{2\alpha} s_{2\beta} s_W^2 - \delta Z_{G-H^-}^* (c_{2\alpha} c_{2\beta} s_W^2 - c_W^2 (1 + s_{2\alpha} s_{2\beta}))) + \\ c_W^4 \delta Z_{H-G^-} (1 - s_{2\alpha} s_{2\beta}) + \\ c_{2\alpha} s_{2\beta} s_W^2 (4 \delta s_W s_W + c_W^2 (\delta \bar{Z}_{H-H^-} + 4 \delta Z_e + 2 \delta Z_{hh} + \delta Z_{G-G^-})) \end{array} \right\} \end{array} \right\}$$

$$\begin{aligned}
C_{109}(h^0, H^0, H^-, H^+) &= \frac{\mathbf{i}e^2}{8c_W^4 s_W^3} \left\{ c_{2\alpha} c_W^4 s_{2\beta} (4\delta s_W - s_W (\delta \bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{H^-H^-})) - \right. \\
&\quad \left. s_W \left\{ \begin{array}{l} 2c_W^4 \delta Z_{hH} + \\ c_{2\beta} s_{2\alpha} s_W^2 (4\delta s_W s_W + c_W^2 (\delta \bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{H^-H^-})) - \\ 2Re(\delta Z_{G^-H^-}) c_W^2 (c_{2\alpha} c_{2\beta} c_W^2 - s_{2\alpha} s_{2\beta} s_W^2) \end{array} \right\} \right\} \\
C_{110}(h^0, H^0, G^-, G^+) &= -\frac{\mathbf{i}e^2}{8c_W^4 s_W^3} \left\{ \begin{array}{l} c_W^2 s_W (2c_W^2 \delta Z_{hH} + s_{2\alpha} s_{2\beta} s_W^2 (\delta Z_{G^-H^-} + \delta Z_{H^-G^-})) - \\ c_{2\beta} s_{2\alpha} s_W^3 (4\delta s_W s_W + c_W^2 (4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + 2\delta Z_{G^-G^-})) + \\ c_{2\alpha} c_W^4 (4\delta s_W s_{2\beta} - s_W (c_{2\beta} (\delta Z_{G^-H^-} + \delta Z_{H^-G^-}) + s_{2\beta} (4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + 2\delta Z_{G^-G^-}))) \end{array} \right\} \\
C_{111}(h^0, H^0, H^-, G^+) &= -\frac{\mathbf{i}e^2}{8c_W^4 s_W^3} \left\{ \begin{array}{l} s_{2\alpha} s_{2\beta} s_W^3 (4\delta s_W s_W + c_W^2 (4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{G^-G^-} + \delta Z_{H^-H^-})) + \\ c_{2\alpha} c_{2\beta} c_W^4 (4\delta s_W - s_W (4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{G^-G^-} + \delta Z_{H^-H^-})) \end{array} \right\} \\
C_{112}(h^0, H^0, G^-, H^+) &= \frac{\mathbf{i}e^2}{8c_W^4 s_W^3} \left\{ \begin{array}{l} c_W^2 \delta Z_{G^-H^-} s_W (c_{2\alpha} c_W^2 s_{2\beta} + c_{2\beta} s_{2\alpha} s_W^2) - \\ s_{2\alpha} s_W^3 (4\delta s_W s_{2\beta} s_W + c_W^2 (c_{2\beta} \delta Z_{H^-G^-} + s_{2\beta} (\delta \bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{G^-G^-}))) - \\ c_{2\alpha} c_W^4 (\delta Z_{H^-G^-} s_{2\beta} s_W + c_{2\beta} (4\delta s_W - s_W (\delta \bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{hh} + \delta Z_{HH} + \delta Z_{G^-G^-}))) \end{array} \right\} \\
C_{113}(H^0, H^0, H^-, H^+) &= \frac{\mathbf{i}e^2}{8c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} (4c_{2\alpha} \delta s_W s_W^4 - c_W^2 s_W^3 (2\delta Z_{hH} s_{2\alpha} - c_{2\alpha} (\delta \bar{Z}_{H^-H^-} + 4\delta Z_e + 2\delta Z_{HH} + \delta Z_{H^-H^-}))) + \\ 2Re(\delta Z_{G^-H^-}) c_W^2 s_W (c_{2\beta} c_W^2 s_{2\alpha} + c_{2\alpha} s_{2\beta} s_W^2) + \\ c_W^4 \left\{ \begin{array}{l} 4\delta s_W (1 + s_{2\alpha} s_{2\beta}) - \\ s_W \left\{ \begin{array}{l} \delta \bar{Z}_{H^-H^-} + 4\delta Z_e + 2\delta Z_{HH} + \delta Z_{H^-H^-} + \\ s_{2\beta} (2c_{2\alpha} \delta Z_{hH} + s_{2\alpha} (\delta \bar{Z}_{H^-H^-} + 4\delta Z_e + 2\delta Z_{HH} + \delta Z_{H^-H^-})) \end{array} \right\} \end{array} \right\} \end{array} \right\} \\
C_{114}(H^0, H^0, G^-, G^+) &= -\frac{\mathbf{i}e^2}{8c_W^4 s_W^3} \left\{ \begin{array}{l} 4c_{2\alpha} c_{2\beta} \delta s_W s_W^4 - \\ c_W^2 s_W^3 (2c_{2\beta} \delta Z_{hH} s_{2\alpha} + c_{2\alpha} (s_{2\beta} (\delta Z_{G^-H^-} + \delta Z_{H^-G^-}) - 2c_{2\beta} (2\delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-}))) - \\ c_W^4 \left\{ \begin{array}{l} \delta s_W (4 - 4s_{2\alpha} s_{2\beta}) - \\ s_W \left\{ \begin{array}{l} 4\delta Z_e + 2(\delta Z_{HH} + \delta Z_{G^-G^-}) - c_{2\beta} s_{2\alpha} (\delta Z_{G^-H^-} + \delta Z_{H^-G^-}) - \\ 2s_{2\beta} (c_{2\alpha} \delta Z_{hH} + s_{2\alpha} (2\delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-})) \end{array} \right\} \end{array} \right\} \end{array} \right\}
\end{aligned}$$

$$C_{115}(H^0, H^0, H^-, G^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{array}{l} s_{2\beta} s_W^3 (2 c_W^2 \delta Z_{hH} s_{2\alpha} - c_{2\alpha} (4 \delta s_W s_W + c_W^2 (4 \delta Z_e + 2 \delta Z_{HH} + \delta Z_{G^-G^-} + \delta Z_{H^-H^-))) + \\ c_W^4 \left\{ \begin{array}{l} 2 \delta Z_{G^-H^-} s_W + \\ c_{2\beta} (4 \delta s_W s_{2\alpha} - s_W (2 c_{2\alpha} \delta Z_{hH} + s_{2\alpha} (4 \delta Z_e + 2 \delta Z_{HH} + \delta Z_{G^-G^-} + \delta Z_{H^-H^-))) \end{array} \right\} \end{array} \right\}$$

$$C_{116}(H^0, H^0, G^-, H^+) = \frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{array}{l} c_{2\beta} \left\{ \begin{array}{l} c_{2\alpha} c_W^2 \delta Z_{H^-G^-} s_W^3 - \\ c_W^4 (4 \delta s_W s_{2\alpha} - s_W (2 c_{2\alpha} \delta Z_{hH} + s_{2\alpha} (\delta \bar{Z}_{H^-H^-} + 4 \delta Z_e + 2 \delta Z_{HH} + \delta Z_{G^-G^-}))) \end{array} \right\} + \\ s_W \left\{ \begin{array}{l} c_{2\alpha} s_{2\beta} s_W^2 (4 \delta s_W s_W + c_W^2 (\delta \bar{Z}_{H^-H^-} + 4 \delta Z_e + 2 \delta Z_{HH} + \delta Z_{G^-G^-})) - \\ c_W^2 \left\{ \begin{array}{l} 2 \delta Z_{hH} s_{2\alpha} s_{2\beta} s_W^2 + \delta Z_{G^-H^-}^* (c_{2\alpha} c_{2\beta} s_W^2 + c_W^2 (1 - s_{2\alpha} s_{2\beta})) + \\ c_W^2 \delta Z_{H^-G^-} (1 + s_{2\alpha} s_{2\beta}) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C_{117}(h^0, A^0, H^-, G^+) = -\frac{e^2}{8 s_W^3} \left\{ \begin{array}{l} c_\beta (4 \delta s_W s_\alpha - s_W (c_\alpha (\delta Z_{AG} - \delta Z_{hH}) + s_\alpha (4 \delta Z_e + \delta Z_{AA} + \delta Z_{hh} + \delta Z_{H^-H^-}))) - \\ s_\beta (c_\alpha (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{hh} + \delta Z_{H^-H^-})) + s_\alpha s_W (\delta Z_{AG} - \delta Z_{hH})) + \\ \delta Z_{G^-G^-} s_{\beta-\alpha} s_W \end{array} \right\}$$

$$C_{118}(h^0, A^0, G^-, H^+) = \frac{e^2}{8 s_W^3} \left\{ \begin{array}{l} s_W (\delta \bar{Z}_{H^-H^-} s_{\beta-\alpha} - s_\alpha s_\beta (\delta Z_{AG} - \delta Z_{hH})) - \\ c_\alpha s_\beta (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{hh} + \delta Z_{G^-G^-})) + \\ c_\beta (4 \delta s_W s_\alpha - s_W (c_\alpha (\delta Z_{AG} - \delta Z_{hH}) + s_\alpha (4 \delta Z_e + \delta Z_{AA} + \delta Z_{hh} + \delta Z_{G^-G^-}))) \end{array} \right\}$$

$$C_{119}(h^0, G^0, H^-, G^+) = -\frac{e^2}{8 s_W^3} \left\{ \begin{array}{l} s_\beta (4 \delta s_W s_\alpha + c_\alpha s_W (\delta Z_{AG} + \delta Z_{hH})) + \\ c_\alpha c_\beta (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{hh} + \delta Z_{H^-H^-})) - \\ s_W (c_{\beta-\alpha} \delta Z_{G^-G^-} + s_\alpha (c_\beta (\delta Z_{AG} + \delta Z_{hH}) + s_\beta (4 \delta Z_e + \delta Z_{GG} + \delta Z_{hh} + \delta Z_{H^-H^-}))) \end{array} \right\}$$

$$C_{120}(h^0, G^0, G^-, H^+) = \frac{e^2}{8 s_W^3} \left\{ \begin{array}{l} s_\beta (4 \delta s_W s_\alpha + c_\alpha s_W (\delta Z_{AG} + \delta Z_{hH})) + \\ c_\alpha c_\beta (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{GG} + \delta Z_{hh} + \delta Z_{G^-G^-})) - \\ s_W (c_{\beta-\alpha} \delta \bar{Z}_{H^-H^-} + s_\alpha (c_\beta (\delta Z_{AG} + \delta Z_{hH}) + s_\beta (4 \delta Z_e + \delta Z_{GG} + \delta Z_{hh} + \delta Z_{G^-G^-}))) \end{array} \right\}$$

$$C_{121}(H^0, A^0, H^-, G^+) = \frac{e^2}{8 s_W^3} \left\{ \begin{array}{l} 4 \delta s_W s_\alpha s_\beta + \\ c_\alpha (c_\beta (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{AA} + \delta Z_{HH} + \delta Z_{H^-H^-})) - s_\beta s_W (\delta Z_{AG} + \delta Z_{hH})) - \\ s_W (c_{\beta-\alpha} \delta Z_{G^-G^-} - s_\alpha (c_\beta (\delta Z_{AG} + \delta Z_{hH}) - s_\beta (4 \delta Z_e + \delta Z_{AA} + \delta Z_{HH} + \delta Z_{H^-H^-}))) \end{array} \right\}$$

$$C_{122}(H^0, A^0, G^-, H^+) = -\frac{e^2}{8s_W^3} \left\{ \begin{array}{l} 4\delta s_W s_\alpha s_\beta - \\ s_W (c_{\beta-\alpha} \delta \bar{Z}_{H^-H^-} - s_\alpha (c_\beta (\delta Z_{AG} + \delta Z_{hH}) - s_\beta (4\delta Z_e + \delta Z_{AA} + \delta Z_{HH} + \delta Z_{G^-G^-}))) + \\ c_\alpha (c_\beta (4\delta s_W - s_W (4\delta Z_e + \delta Z_{AA} + \delta Z_{HH} + \delta Z_{G^-G^-})) - s_\beta s_W (\delta Z_{AG} + \delta Z_{hH})) \end{array} \right\}$$

$$C_{123}(H^0, G^0, H^-, G^+) = \frac{e^2}{8s_W^3} \left\{ \begin{array}{l} c_\alpha s_\beta (4\delta s_W - s_W (4\delta Z_e + \delta Z_{GG} + \delta Z_{HH} + \delta Z_{H^-H^-})) - \\ c_\beta (4\delta s_W s_\alpha + s_W (c_\alpha (\delta Z_{AG} - \delta Z_{hH}) - s_\alpha (4\delta Z_e + \delta Z_{GG} + \delta Z_{HH} + \delta Z_{H^-H^-}))) - \\ s_W (\delta Z_{G^-G^-} s_{\beta-\alpha} + s_\alpha s_\beta (\delta Z_{AG} - \delta Z_{hH})) \end{array} \right\}$$

$$C_{124}(H^0, G^0, G^-, H^+) = \frac{e^2}{8s_W^3} \left\{ \begin{array}{l} s_W (\delta \bar{Z}_{H^-H^-} s_{\beta-\alpha} + s_\alpha s_\beta (\delta Z_{AG} - \delta Z_{hH})) - \\ c_\alpha s_\beta (4\delta s_W - s_W (4\delta Z_e + \delta Z_{GG} + \delta Z_{HH} + \delta Z_{G^-G^-})) + \\ c_\beta (4\delta s_W s_\alpha + s_W (c_\alpha (\delta Z_{AG} - \delta Z_{hH}) - s_\alpha (4\delta Z_e + \delta Z_{GG} + \delta Z_{HH} + \delta Z_{G^-G^-}))) \end{array} \right\}$$

$$C_{125}(A^0, A^0, A^0, A^0) = \frac{3ie^2}{64c_W^4 s_W^3} \left\{ \begin{array}{l} \delta s_W s_W^2 \left(9s_{2\beta}^6 - 32s_\beta^{12} + 16s_{2\beta}^2 s_\beta^4 (2 - 3s_\beta^4) - 2s_{2\beta}^4 (8 - 4c_{2\beta} - s_\beta^4) \right) - \\ 32c_\beta^{12} (\delta s_W s_W^2 - c_W^2 (\delta s_W - s_W (\delta Z_e + \delta Z_{AA}))) - \\ 2c_\beta^2 s_{2\beta}^2 \left(c_W^2 \delta Z_{AG} s_{2\beta} s_W (14 - 3s_{2\beta}^2) + 4c_{2\beta} (4 - s_{2\beta}^2) (\delta s_W s_W^2 - c_W^2 (\delta s_W - s_W (\delta Z_e + \delta Z_{AA}))) \right) + \\ s_{2\beta} \left\{ \begin{array}{l} 4c_\beta^6 \left(c_W^2 \delta Z_{AG} s_W (4 + 5s_{2\beta}^2) + 8c_{2\beta} s_{2\beta} (\delta s_W s_W^2 - c_W^2 (\delta s_W - s_W (\delta Z_e + \delta Z_{AA}))) \right) + \\ 2c_\beta^4 \left\{ \begin{array}{l} s_{2\beta} (\delta s_W s_W^2 - c_W^2 (\delta s_W - s_W (\delta Z_e + \delta Z_{AA}))) (16 - 24c_{2\beta}^2 - 11s_{2\beta}^2) - \\ 8c_{2\beta} c_W^2 \delta Z_{AG} s_W (1 + 3s_{2\beta}^2) \end{array} \right\} \end{array} \right\} - \\ c_W^2 \left\{ \begin{array}{l} (\delta s_W - s_W (\delta Z_e + \delta Z_{AA})) \left(9s_{2\beta}^6 - 48s_{2\beta}^2 s_\beta^8 - 32s_\beta^{12} - 8s_{2\beta}^4 (2 - c_{2\beta}) + s_\beta^4 (32s_{2\beta}^2 + 2s_{2\beta}^4) \right) + \\ \delta Z_{AG} s_{2\beta} s_W \left(16 (c_{2\beta} c_\beta^8 + c_\beta^{10}) + 2 (s_{2\beta}^2 s_\beta^2 (3s_{2\beta}^2 - 2 (7 - s_\beta^2 - 6s_\beta^4)) + c_{2\beta} (11s_{2\beta}^4 - 12s_{2\beta}^2 (1 - 2s_\beta^4) + 8 (s_\beta^4 + s_\beta^8))) \right) + \\ s_W \left\{ \begin{array}{l} 128c_\beta^{11} \delta c_\beta - 32c_{2\beta} c_\beta^7 \delta s_\beta s_{2\beta} + \\ 2c_\beta s_{2\beta}^2 (2c_{2\beta} \delta c_\beta (12 - 5s_{2\beta}^2) + \delta s_\beta s_{2\beta} (16 - 15s_{2\beta}^2)) - \\ s_\beta (48c_{2\beta} \delta s_\beta s_{2\beta}^2 - 20c_{2\beta} \delta s_\beta s_{2\beta}^4 + 42\delta c_\beta s_{2\beta}^5 - 8\delta c_\beta s_{2\beta}^3 (4 - c_{2\beta})) + \\ 144\delta s_\beta s_{2\beta}^2 s_\beta^7 + 96\delta c_\beta s_{2\beta} s_\beta^9 - s_\beta^5 (32\delta c_\beta s_{2\beta} - 112c_{2\beta} \delta s_\beta s_{2\beta}^2 - 32\delta c_\beta s_{2\beta}^3) - s_\beta^3 (48\delta s_\beta s_{2\beta}^2 - 16c_{2\beta} \delta c_\beta s_{2\beta}^3 + 24\delta s_\beta s_{2\beta}^4) + \\ 128\delta s_\beta s_\beta^{11} + \\ s_{2\beta} \left\{ \begin{array}{l} 8c_\beta^3 (18c_{2\beta}^2 \delta c_\beta s_{2\beta} - 6\delta c_\beta s_{2\beta} (1 - s_{2\beta}^2) + c_{2\beta} \delta s_\beta (4 - 3s_{2\beta}^2)) - \\ 16c_\beta^5 (7c_{2\beta} \delta c_\beta s_{2\beta} - \delta s_\beta (4 - s_{2\beta}^2)) \end{array} \right\} \end{array} \right\} \end{array} \right\}$$

$$C(A^0, A^0, A^0, G^0) = \frac{3ie^2}{16c_W^4 s_W^3}$$

$$\left\{ \begin{aligned} & c_{2\beta} s_{2\beta} \left\{ \begin{aligned} & c_W^2 s_W \left(\delta Z_{AG} s_{2\beta} \left(1 + c_\beta^2 \right) \left(4c_\beta^2 - 4c_\beta^4 - s_{2\beta}^2 \right) - 2\delta c_\beta \left(8c_\beta^7 + 2c_\beta^3 \left(2 + 9s_{2\beta}^2 \right) - s_{2\beta} s_\beta \left(6 - 11s_{2\beta}^2 - 12s_\beta^4 \right) \right) \right) - \\ & c_\beta^8 \left(4\delta s_W s_W^2 - c_W^2 \left(4\delta s_W - s_W \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \right) - \\ & c_\beta^4 \left\{ \begin{aligned} & 4\delta s_W s_W^2 \left(1 + 22s_\beta^4 \right) - \\ & c_W^2 \left\{ \begin{aligned} & \delta s_W \left(4 + 88s_\beta^4 \right) - \\ & s_W \left(176\delta s_\beta s_\beta^3 + \delta Z_e \left(4 + 88s_\beta^4 \right) + \left(1 + 22s_\beta^4 \right) \left(3\delta Z_{AA} + \delta Z_{GG} \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & s_\beta \left\{ \begin{aligned} & c_W^2 \delta s_\beta s_W \left(24c_\beta^2 - 48c_\beta^6 \right) + \\ & s_{2\beta} \left(3c_\beta - 6c_\beta^5 \right) \left(4\delta s_W s_W^2 - c_W^2 \left(4\delta s_W - s_W \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \right) - \\ & s_\beta^2 \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(1 + 3s_{2\beta}^2 + s_\beta^4 \right) - \\ & 4\delta s_W \left(s_\beta + 3s_{2\beta}^2 s_\beta + s_\beta^5 \right) - \\ & c_W^2 \left\{ \begin{aligned} & 4\delta s_\beta \left(2 + 9s_{2\beta}^2 + 4s_\beta^4 \right) + \\ & s_\beta \left(1 + 3s_{2\beta}^2 + s_\beta^4 \right) \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \\ & 2 \left\{ \begin{aligned} & c_\beta^{11} \left(4\delta s_W s_\beta s_W^2 - c_W^2 \left(4\delta s_W s_\beta - s_W \left(2\delta s_\beta + s_\beta \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \right) \right) + \\ & \frac{c_W^2 s_W}{32} \left\{ \begin{aligned} & 4\delta c_\beta s_{2\beta} \left(56c_\beta^9 - 2c_\beta^5 \left(12 + 37s_{2\beta}^2 \right) + c_\beta s_{2\beta}^2 \left(38 - 13s_{2\beta}^2 \right) + 2s_{2\beta} s_\beta^3 \left(11s_{2\beta}^2 - 2 \left(9 - s_\beta^2 - 4s_\beta^4 \right) \right) \right) - \\ & \delta Z_{AG} \left\{ \begin{aligned} & 32c_\beta^8 - 32c_\beta^{12} - 39s_{2\beta}^6 + 32s_\beta^8 \left(1 - s_\beta^4 \right) + s_{2\beta}^4 \left(44 - 94s_\beta^4 \right) - \\ & s_{2\beta}^2 \left(16s_\beta^4 \left(2 + 3s_\beta^4 \right) + 2c_\beta^4 \left(16 + 24c_{2\beta}^2 + 59s_{2\beta}^2 \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & \frac{s_{2\beta} s_\beta^5}{2} \left\{ \begin{aligned} & 2c_W^2 \delta s_\beta s_W \left(3 - 7s_\beta^4 \right) + \\ & c_\beta^2 s_\beta \left(1 + s_\beta^2 \right) \left(4\delta s_W s_W^2 - c_W^2 \left(4\delta s_W - s_W \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \right) \end{aligned} \right\} - \\ & \frac{s_{2\beta}^3 s_\beta}{8} \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(7 - 5s_\beta^4 \right) - \\ & c_W^2 \left\{ \begin{aligned} & 4\delta s_W s_\beta \left(7 - 5s_\beta^4 \right) - \\ & s_W \left(\delta s_\beta \left(38 - 74s_\beta^4 \right) + s_\beta \left(7 - 5s_\beta^4 \right) \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \end{aligned} \right\} \end{aligned} \right\} - \\ & c_\beta^7 \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(1 + 6s_\beta^4 \right) - \\ & c_W^2 \left(4\delta s_W \left(s_\beta + 6s_\beta^5 \right) - s_W \left(\delta s_\beta \left(2 + 44s_\beta^4 \right) + s_\beta \left(1 + 6s_\beta^4 \right) \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \right) \end{aligned} \right\} - \\ & s_\beta^2 \left\{ \begin{aligned} & c_\beta^9 \left(20\delta s_W s_\beta s_W^2 + c_W^2 \left(6\delta s_\beta s_W - 5s_\beta \left(4\delta s_W - s_W \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \right) \right) \right) - \\ & c_\beta^5 \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(7 + 6s_\beta^4 \right) - \\ & 4\delta s_W s_\beta \left(7 + 6s_\beta^4 \right) - \\ & c_W^2 \left\{ \begin{aligned} & 2\delta s_\beta \left(9 + 26s_\beta^4 \right) + \\ & s_\beta \left(7 + 6s_\beta^4 \right) \left(4\delta Z_e + 3\delta Z_{AA} + \delta Z_{GG} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} -$$

$$C_{127}(A^0, A^0, G^0, G^0) = -\frac{ie^2}{32 c_W^4 s_W^3} \left\{ c_W^2 \left\{ s_W \left\{ \begin{aligned} & 2 \delta s_W s_W^2 \left(12 s_{2\beta}^6 + 16 s_{2\beta}^2 s_\beta^4 - 8 s_\beta^8 - 3 s_{2\beta}^4 (5 - 2 c_{2\beta} - 8 s_\beta^4) \right) - \right. \\ & \left. \left(8 c_\beta^8 - s_{2\beta}^2 \left(8 c_\beta^4 (2 + 3 s_{2\beta}^2) + c_{2\beta} (24 c_\beta^6 - 6 c_\beta^2 (4 - s_{2\beta}^2)) \right) \right) (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}))) \right) + \right. \\ & \left. \left[\begin{aligned} & 2 \delta s_W (8 s_\beta^8 - 8 s_{2\beta}^2 s_\beta^4 (2 + 3 s_{2\beta}^2) + 3 s_{2\beta}^4 (5 - 2 c_{2\beta} - 4 s_{2\beta}^2)) - \\ & \left[\begin{aligned} & 48 c_\beta^9 \delta s_\beta s_{2\beta} + 6 c_\beta s_{2\beta}^2 (2 \delta s_\beta s_{2\beta} (5 - 8 s_{2\beta}^2) + c_{2\beta} \delta c_\beta (12 - 5 s_{2\beta}^2)) + \\ & 12 c_\beta^3 s_{2\beta} (c_{2\beta} \delta s_\beta (4 - 3 s_{2\beta}^2) - \delta c_\beta s_{2\beta} (4 + 13 s_{2\beta}^2)) - \\ & 8 (c_\beta^5 s_{2\beta} (21 c_{2\beta} \delta c_\beta s_{2\beta} + \delta s_\beta (4 + 9 s_{2\beta}^2)) + c_\beta^7 (6 c_{2\beta} \delta s_\beta s_{2\beta} - \delta c_\beta (4 - 3 s_{2\beta}^2))) - \\ & s_\beta (72 c_{2\beta} \delta s_\beta s_{2\beta}^2 - 30 c_{2\beta} \delta s_\beta s_{2\beta}^4 + 96 \delta c_\beta s_{2\beta}^5 - 12 \delta c_\beta s_{2\beta}^3 (5 - c_{2\beta})) - \\ & s_\beta^5 (32 \delta c_\beta s_{2\beta} - 168 c_{2\beta} \delta s_\beta s_{2\beta}^2 + 72 \delta c_\beta s_{2\beta}^3) + s_\beta^3 (48 \delta s_\beta s_{2\beta}^2 - 24 c_{2\beta} \delta c_\beta s_{2\beta}^3 + 156 \delta s_\beta s_{2\beta}^4) + \\ & 48 \delta c_\beta s_{2\beta} s_\beta^9 + \delta s_\beta s_\beta^7 (32 - 24 s_{2\beta}^2) - \\ & (2 \delta Z_e + \delta Z_{AA} + \delta Z_{GG}) (12 s_{2\beta}^6 - 8 s_\beta^8 - 3 s_{2\beta}^4 (5 - 2 c_{2\beta}) + s_\beta^4 (16 s_{2\beta}^2 + 24 s_{2\beta}^4)) \end{aligned} \right] \end{aligned} \right] \right\} \right\} \end{aligned} \right\}$$

$$C(A^0, G^0, G^0, G^0) = \frac{3ie^2}{16c_W^4 s_W^3}$$

$$\left\{ \begin{aligned} & c_{2\beta} s_{2\beta} \left\{ \begin{aligned} & c_W^2 s_W \left(\delta Z_{AG} s_{2\beta} \left(1 + c_\beta^2 \right) \left(4c_\beta^2 - 4c_\beta^4 - s_{2\beta}^2 \right) + 2\delta c_\beta \left(8c_\beta^7 + 2c_\beta^3 \left(2 + 9s_{2\beta}^2 \right) - s_{2\beta} s_\beta \left(6 - 11s_{2\beta}^2 - 12s_\beta^4 \right) \right) \right) + \\ & c_\beta^8 \left(4\delta s_W s_W^2 - c_W^2 \left(4\delta s_W - s_W \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \right) + \\ & c_\beta^4 \left\{ \begin{aligned} & 4\delta s_W s_W^2 \left(1 + 22s_\beta^4 \right) - \\ & c_W^2 \left\{ \begin{aligned} & \delta s_W \left(4 + 88s_\beta^4 \right) - \\ & s_W \left(176\delta s_\beta s_\beta^3 + \delta Z_e \left(4 + 88s_\beta^4 \right) + \left(1 + 22s_\beta^4 \right) \left(\delta Z_{AA} + 3\delta Z_{GG} \right) \right) \end{aligned} \right\} \end{aligned} \right\} - \\ & s_\beta \left\{ \begin{aligned} & c_W^2 \delta s_\beta s_W \left(24c_\beta^2 - 48c_\beta^6 \right) + \\ & s_{2\beta} \left(3c_\beta - 6c_\beta^5 \right) \left(4\delta s_W s_W^2 - c_W^2 \left(4\delta s_W - s_W \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \right) - \\ & s_\beta^2 \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(1 + 3s_{2\beta}^2 + s_\beta^4 \right) - \\ & 4\delta s_W \left(s_\beta + 3s_{2\beta}^2 s_\beta + s_\beta^5 \right) - \\ & c_W^2 \left\{ \begin{aligned} & 4\delta s_\beta \left(2 + 9s_{2\beta}^2 + 4s_\beta^4 \right) + \\ & s_W \left\{ \begin{aligned} & s_\beta \left(1 + 3s_{2\beta}^2 + s_\beta^4 \right) \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \\ & 2 \left\{ \begin{aligned} & c_\beta^{11} \left(4\delta s_W s_\beta s_W^2 - c_W^2 \left(4\delta s_W s_\beta - s_W \left(2\delta s_\beta + s_\beta \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \right) \right) + \\ & \frac{c_W^2 s_W}{32} \left\{ \begin{aligned} & 4\delta c_\beta s_{2\beta} \left(56c_\beta^9 - 2c_\beta^5 \left(12 + 37s_{2\beta}^2 \right) + c_\beta s_{2\beta}^2 \left(38 - 13s_{2\beta}^2 \right) + 2s_{2\beta} s_\beta^3 \left(11s_{2\beta}^2 - 2 \left(9 - s_\beta^2 - 4s_\beta^4 \right) \right) \right) + \\ & \delta Z_{AG} \left\{ \begin{aligned} & 32c_\beta^8 - 32c_\beta^{12} - 39s_{2\beta}^6 + 32s_\beta^8 \left(1 - s_\beta^4 \right) + s_{2\beta}^4 \left(44 - 94s_\beta^4 \right) - \\ & s_{2\beta}^2 \left(16s_\beta^4 \left(2 + 3s_\beta^4 \right) + 2c_\beta^4 \left(16 + 24c_{2\beta}^2 + 59s_{2\beta}^2 \right) \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & \frac{s_{2\beta} s_\beta^5}{2} \left\{ \begin{aligned} & 2c_W^2 \delta s_\beta s_W \left(3 - 7s_\beta^4 \right) + \\ & c_\beta^2 s_\beta \left(1 + s_\beta^2 \right) \left(4\delta s_W s_W^2 - c_W^2 \left(4\delta s_W - s_W \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \right) \end{aligned} \right\} - \\ & \frac{s_{2\beta}^3 s_\beta}{8} \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(7 - 5s_\beta^4 \right) - \\ & c_W^2 \left\{ \begin{aligned} & 4\delta s_W s_\beta \left(7 - 5s_\beta^4 \right) - \\ & s_W \left(\delta s_\beta \left(38 - 74s_\beta^4 \right) + s_\beta \left(7 - 5s_\beta^4 \right) \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \end{aligned} \right\} \end{aligned} \right\} - \\ & c_\beta^7 \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(1 + 6s_\beta^4 \right) - \\ & c_W^2 \left(4\delta s_W \left(s_\beta + 6s_\beta^5 \right) - s_W \left(\delta s_\beta \left(2 + 44s_\beta^4 \right) + s_\beta \left(1 + 6s_\beta^4 \right) \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \right) \end{aligned} \right\} - \\ & s_\beta^2 \left\{ \begin{aligned} & c_\beta^9 \left(20\delta s_W s_\beta s_W^2 + c_W^2 \left(6\delta s_\beta s_W - 5s_\beta \left(4\delta s_W - s_W \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \right) \right) \right) - \\ & c_\beta^5 \left\{ \begin{aligned} & 4\delta s_W s_\beta s_W^2 \left(7 + 6s_\beta^4 \right) - \\ & 4\delta s_W s_\beta \left(7 + 6s_\beta^4 \right) - \\ & c_W^2 \left\{ \begin{aligned} & 2\delta s_\beta \left(9 + 26s_\beta^4 \right) + \\ & s_W \left\{ \begin{aligned} & s_\beta \left(7 + 6s_\beta^4 \right) \left(4\delta Z_e + \delta Z_{AA} + 3\delta Z_{GG} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} + \end{aligned}$$

$$C_{132}(A^0, A^0, G^-, H^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & c_W^2 s_W \left(c_{2\beta}^2 \delta Z_{H^- G^-} - \delta Z_{G^- H^-}^* \left(c_{2\beta}^2 - 2 c_W^2 \right) - 2 \delta Z_{AG} (c_W - s_{2\beta}) (c_W + s_{2\beta}) \right) + \\ & c_{2\beta} s_{2\beta} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 \delta s_W - s_W \left(\delta \bar{Z}_{H^- H^-} + 16 c_\beta \delta c_\beta + 4 \delta Z_e + 2 \delta Z_{AA} + \delta Z_{G^- G^-} + 16 \delta s_\beta s_\beta \right) \right) \right) \end{aligned} \right\}$$

$$C_{133}(A^0, A^0, G^-, G^+) = \frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & 4 \left(c_{2\beta}^2 \delta s_W s_W^4 + c_W^4 \left(\delta s_W \left(1 + s_{2\beta}^2 \right) - s_W \left(6 c_\beta \delta c_\beta + 2 \delta Z_e + \delta Z_{AA} + \delta Z_{G^- G^-} + 6 \delta s_\beta s_\beta \right) \right) \right) + \\ & c_{2\beta} c_W^2 s_W \left\{ \begin{aligned} & s_{2\beta} \left(2 \delta Z_{AG} - \delta Z_{G^- H^-} - \delta Z_{H^- G^-} \right) + \\ & 2 c_{2\beta} \left(8 c_\beta \delta c_\beta + 2 \delta Z_e + \delta Z_{AA} + \delta Z_{G^- G^-} + 8 \delta s_\beta s_\beta \right) \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{134}(A^0, G^0, H^-, H^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & c_{2\beta} s_{2\beta} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 \delta s_W - s_W \left(\delta \bar{Z}_{H^- H^-} + 16 c_\beta \delta c_\beta + 4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{H^- H^-} + 16 \delta s_\beta s_\beta \right) \right) \right) + \\ & s_W \left(2 c_W^4 \delta Z_{AG} - 2 \text{Re}(\delta Z_{G^- H^-}) c_W^2 (c_W^2 - s_{2\beta}^2) \right) \end{aligned} \right\}$$

$$C_{135}(A^0, G^0, H^-, G^+) = -\frac{i e^2}{32 c_W^4 s_W^3} \left\{ \begin{aligned} & c_W^4 \left(\delta s_W \left(16 + s_{2\beta}^6 - 8 \left(s_{2\beta}^2 + s_{2\beta}^4 \right) \right) - 4 s_W \left(16 c_\beta \delta c_\beta + 4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{G^- G^-} + \delta Z_{H^- H^-} + 16 c_{2\beta}^2 \delta s_\beta s_\beta \right) \right) - \\ & s_{2\beta}^2 \left\{ \begin{aligned} & \delta s_W s_W^2 \left(8 \left(c_\beta^8 + s_\beta^8 \right) - s_W^2 \left(24 - 8 s_{2\beta}^2 + s_{2\beta}^4 \right) \right) + \\ & 4 c_W^2 \left\{ \begin{aligned} & \delta s_W \left(2 - 4 s_W^2 \right) \left(c_\beta^8 + s_\beta^8 \right) - \\ & s_W \left(16 c_\beta \delta c_\beta + 4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{G^- G^-} + \delta Z_{H^- H^-} + 16 \delta s_\beta s_\beta s_W^2 \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{136}(A^0, G^0, G^-, H^+) = -\frac{i e^2}{32 c_W^4 s_W^3} \left\{ \begin{aligned} & c_W^4 \left(\delta s_W \left(16 + s_{2\beta}^6 - 8 \left(s_{2\beta}^2 + s_{2\beta}^4 \right) \right) - 4 s_W \left(\delta \bar{Z}_{H^- H^-} + 16 c_\beta \delta c_\beta + 4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{G^- G^-} + 16 c_{2\beta}^2 \delta s_\beta s_\beta \right) \right) - \\ & s_{2\beta} \left\{ \begin{aligned} & 2 s_W \left(2 c_{2\beta} c_W^2 \delta Z_{G^- H^-}^* + \frac{\delta s_W s_{2\beta} s_W}{2} \left(8 \left(c_\beta^8 + s_\beta^8 \right) - s_W^2 \left(24 - 8 s_{2\beta}^2 + s_{2\beta}^4 \right) \right) \right) + \\ & 4 c_W^2 \left\{ \begin{aligned} & \delta s_W s_{2\beta} \left(2 - 4 s_W^2 \right) \left(c_\beta^8 + s_\beta^8 \right) - \\ & s_W \left\{ \begin{aligned} & c_{2\beta} \delta Z_{H^- G^-} + \\ & s_{2\beta} \left(\delta \bar{Z}_{H^- H^-} + 16 c_\beta \delta c_\beta + 4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + \delta Z_{G^- G^-} + 16 \delta s_\beta s_\beta s_W^2 \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{137}(A^0, G^0, G^-, G^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & c_W^2 s_W \left(s_{2\beta}^2 \left(\delta Z_{G^- H^-} + \delta Z_{H^- G^-} \right) + c_W^2 \left(2 \delta Z_{AG} - \delta Z_{G^- H^-} - \delta Z_{H^- G^-} \right) \right) - \\ & c_{2\beta} s_{2\beta} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 \delta s_W - s_W \left(16 c_\beta \delta c_\beta + 4 \delta Z_e + \delta Z_{AA} + \delta Z_{GG} + 2 \delta Z_{G^- G^-} + 16 \delta s_\beta s_\beta \right) \right) \right) \end{aligned} \right\}$$

$$C_{138}(G^0, G^0, H^-, H^+) = \frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & 4 c_{2\beta}^2 \delta s_W s_W^4 + \\ & c_W^4 \left(4 \delta s_W \left(1 + s_{2\beta}^2 \right) - 2 s_W \left(\delta \bar{Z}_{H^- H^-} + 12 c_\beta \delta c_\beta + 4 \delta Z_e + 2 \delta Z_{GG} + \delta Z_{H^- H^-} + 12 \delta s_\beta s_\beta \right) \right) + \\ & c_{2\beta} c_W^2 s_W \left\{ \begin{aligned} & c_{2\beta} \left(\delta \bar{Z}_{H^- H^-} + 16 c_\beta \delta c_\beta + 4 \delta Z_e + 2 \delta Z_{GG} + \delta Z_{H^- H^-} + 16 \delta s_\beta s_\beta \right) + \\ & s_{2\beta} \left(2 \text{Re}(\delta Z_{G^- H^-}) - 2 \delta Z_{AG} \right) \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{139}(G^0, G^0, H^-, G^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & s_W (2 c_W^4 \delta Z_{G^- H^-} - 2 c_W^2 \delta Z_{AG} (c_W - s_{2\beta}) (c_W + s_{2\beta})) - \\ & c_{2\beta} s_{2\beta} (4 \delta s_W s_W^2 - c_W^2 (4 \delta s_W - s_W (16 c_\beta \delta c_\beta + 4 \delta Z_e + 2 \delta Z_{GG} + \delta Z_{G^- G^-} + \delta Z_{H^- H^-} + 16 \delta s_\beta s_\beta))) \end{aligned} \right\}$$

$$C_{140}(G^0, G^0, G^-, H^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & c_W^2 s_W (c_{2\beta}^2 \delta Z_{G^- H^-}^* - \delta Z_{H^- G^-} (c_{2\beta}^2 - 2 c_W^2) - 2 \delta Z_{AG} (c_W^2 - s_{2\beta}^2)) - \\ & c_{2\beta} s_{2\beta} (4 \delta s_W s_W^2 - c_W^2 (4 \delta s_W - s_W (\delta \bar{Z}_{H^- H^-} + 16 c_\beta \delta c_\beta + 4 \delta Z_e + 2 \delta Z_{GG} + \delta Z_{G^- G^-} + 16 \delta s_\beta s_\beta))) \end{aligned} \right\}$$

$$C_{141}(G^0, G^0, G^-, G^+) = \frac{i e^2 c_{2\beta}}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & c_W^2 s_{2\beta} s_W (2 \delta Z_{AG} + \delta Z_{G^- H^-} + \delta Z_{H^- G^-}) - \\ & 2 c_{2\beta} (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (8 c_\beta \delta c_\beta + 2 \delta Z_e + \delta Z_{GG} + \delta Z_{G^- G^-} + 8 \delta s_\beta s_\beta))) \end{aligned} \right\}$$

$$C_{142}(H^-, H^-, H^+, H^+) = -\frac{i e^2 c_{2\beta}}{2 c_W^4 s_W^3} (c_W^2 s_W (c_{2\beta} \delta \bar{Z}_{H^- H^-} + 2 \text{Re}(\delta Z_{G^- H^-}) s_{2\beta}) + (c_\beta^2 - s_\beta^2) (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{H^- H^-}))))$$

$$C_{143}(H^-, H^-, H^+, G^+) = -\frac{i e^2}{4 c_W^4 s_W^3} \left\{ \begin{aligned} & \frac{c_W^2 s_W}{2} (2 s_{2\beta} (c_{2\beta} \delta \bar{Z}_{H^- H^-} + \delta Z_{G^- H^-}^* s_{2\beta}) + \delta Z_{G^- H^-} (2 c_{2\beta}^2 - 2 c_\beta^4 + 3 s_{2\beta}^2 - 2 s_\beta^4)) + \\ & c_{2\beta} s_{2\beta} (4 \delta s_W s_W^2 - c_W^2 (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{G^- G^-} + 2 \delta Z_{H^- H^-}))) \end{aligned} \right\}$$

$$C_{144}(H^-, H^-, G^+, G^+) = -\frac{i e^2 s_{2\beta}^2}{2 c_W^4 s_W^3} (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-})))$$

$$C_{145}(H^-, G^-, H^+, H^+) = -\frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & 8 c_{2\beta} s_{2\beta} (\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W)) - \\ & c_W^2 s_W \left\{ \begin{aligned} & 2 \delta Z_{G^- H^-}^* - 2 \delta Z_{H^- G^-} (c_\beta^4 + s_\beta^4) - \\ & s_{2\beta} (4 c_{2\beta} \delta \bar{Z}_{H^- H^-} + (2 c_\beta^2 - 2 s_\beta^2) (\delta Z_{G^- G^-} + \delta Z_{H^- H^-})) - \\ & s_{2\beta}^2 (8 \text{Re}(\delta Z_{G^- H^-}) - 2 \delta Z_{G^- H^-} - \delta Z_{H^- G^-}) \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{146}(H^-, G^-, H^+, G^+) = \frac{i e^2}{8 c_W^4 s_W^3} \left\{ \begin{aligned} & 2 c_{2\beta} c_W^2 s_{2\beta} s_W (\delta Z_{G^- H^-}^* - \delta Z_{H^- G^-}) - \\ & (4 \delta s_W s_W^2 - c_W^2 (4 \delta s_W - s_W (\delta \bar{Z}_{H^- H^-} + 4 \delta Z_e + 2 \delta Z_{G^- G^-} + \delta Z_{H^- H^-}))) \left(\frac{3 s_{2\beta}^2}{2} - c_\beta^4 - s_\beta^4 \right) \end{aligned} \right\}$$

$$C_{147}(H^-, G^-, G^+, G^+) = -\frac{i e^2 s_{2\beta}}{4 c_W^4 s_W^3} \left\{ \begin{aligned} & 4 \delta s_W s_\beta^2 s_W^2 - c_\beta^2 (4 \delta s_W s_W^2 - c_W^2 (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-}))) - \\ & c_W^2 \left\{ \begin{aligned} & s_W (2 c_{2\beta} \delta Z_{G^- G^-} - s_{2\beta} (\delta Z_{G^- H^-} + \delta Z_{H^- G^-})) + \\ & s_\beta^2 (4 \delta s_W - s_W (4 \delta Z_e + \delta Z_{G^- G^-} + \delta Z_{H^- H^-})) \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{148}(G^-, G^-, H^+, H^+) = -\frac{i e^2 s_{2\beta}}{2 c_W^4 s_W^3} (2 \delta s_W s_{2\beta} s_W^2 - c_W^2 (2 \delta s_W s_{2\beta} + s_W (c_{2\beta} (\delta Z_{G^- H^-}^* - \delta Z_{H^- G^-}) - s_{2\beta} (\delta \bar{Z}_{H^- H^-} + 2 \delta Z_e + \delta Z_{G^- G^-}))))$$

$$C_{149}(G^-, G^-, H^+, G^+) = -\frac{\mathbf{i} e^2}{4 c_W^4 s_W^3} \left\{ \frac{c_W^2 s_W}{2} \left(2 c_{2\beta}^2 \delta Z_{G^- H^-}^* - 2 c_{2\beta} \delta \bar{Z}_{H^- H^-} s_{2\beta} + 2 \delta Z_{G^- H^-} s_{2\beta}^2 - \delta Z_{H^- G^-} \left(2 c_\beta^4 - 3 s_{2\beta}^2 + 2 s_\beta^4 \right) \right) - \right. \\ \left. c_{2\beta} s_{2\beta} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 \delta s_W - s_W \left(4 \delta Z_e + 3 \delta Z_{G^- G^-} \right) \right) \right) \right\}$$

$$C_{150}(G^-, G^-, G^+, G^+) = \frac{\mathbf{i} e^2 c_{2\beta}}{2 c_W^4 s_W^3} \left\{ 2 \delta s_W s_\beta^2 s_W^2 - c_\beta^2 \left(2 \delta s_W s_W^2 - c_W^2 \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_{G^- G^-} \right) \right) \right) - \right. \\ \left. c_W^2 \left(s_\beta^2 \left(2 \delta s_W - s_W \left(2 \delta Z_e + 3 \delta Z_{G^- G^-} \right) \right) + s_W \left(\delta Z_{G^- G^-} - s_{2\beta} \left(\delta Z_{G^- H^-} + \delta Z_{H^- G^-} \right) \right) \right) \right\}$$

$$\begin{aligned}
& \left\{ c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} \left\{ \begin{aligned} & 2 c_W^2 m_{e1} m_{e2} U_{s2,1}^{\tilde{e},j2} U_{s3,2}^{\tilde{e},j2*} U_{s4,2}^{\tilde{e},j1} + \\ & c_\beta^2 M_W^2 U_{s4,1}^{\tilde{e},j1} \left(U_{s2,1}^{\tilde{e},j2} U_{s3,1}^{\tilde{e},j2*} - 2 s_W^2 U_{s2,2}^{\tilde{e},j2} U_{s3,2}^{\tilde{e},j2*} \right) \end{aligned} \right\} + \\ & \delta_{j1,j2} \delta_{j3,j4} \left\{ \begin{aligned} & 2 c_W^2 m_{e1} m_{e3} U_{s2,2}^{\tilde{e},j1} U_{s3,2}^{\tilde{e},j3*} U_{s4,1}^{\tilde{e},j3} + \\ & c_\beta^2 M_W^2 U_{s2,1}^{\tilde{e},j1} \left(U_{s3,1}^{\tilde{e},j3*} U_{s4,1}^{\tilde{e},j3} - 2 s_W^2 U_{s3,2}^{\tilde{e},j3*} U_{s4,2}^{\tilde{e},j3} \right) \end{aligned} \right\} \end{aligned} \right\} + \\ & 2 \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) \left\{ \begin{aligned} & c_\beta^2 M_W^2 s_W^2 \left\{ \begin{aligned} & 2 \delta_{j1,j4} \delta_{j2,j3} U_{s2,2}^{\tilde{e},j2} U_{s3,2}^{\tilde{e},j2*} U_{s4,2}^{\tilde{e},j1} - \\ & \delta_{j1,j2} \delta_{j3,j4} U_{s2,2}^{\tilde{e},j1} \left(U_{s3,1}^{\tilde{e},j3*} U_{s4,1}^{\tilde{e},j3} - 2 U_{s3,2}^{\tilde{e},j3*} U_{s4,2}^{\tilde{e},j3} \right) \end{aligned} \right\} + \\ & \delta_{j1,j4} \delta_{j2,j3} U_{s3,1}^{\tilde{e},j2*} \left(c_W^2 m_{e1} m_{e2} U_{s2,2}^{\tilde{e},j2} U_{s4,1}^{\tilde{e},j1} - c_\beta^2 M_W^2 s_W^2 U_{s2,1}^{\tilde{e},j2} U_{s4,2}^{\tilde{e},j1} \right) + \\ & c_W^2 \delta_{j1,j2} \delta_{j3,j4} m_{e1} m_{e3} U_{s2,1}^{\tilde{e},j1} U_{s3,1}^{\tilde{e},j3*} U_{s4,2}^{\tilde{e},j3} \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\} + \\
& \left\{ \delta_{j1,j4} \delta_{j2,j3} \left\{ \begin{aligned} & c_\beta^3 M_W^4 \left\{ \begin{aligned} & U_{s3,1}^{\tilde{e},j2*} \left\{ \begin{aligned} & c_W^2 s_W U_{s4,1}^{\tilde{e},j1} \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j2} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j2} \right) + \\ & U_{s2,1}^{\tilde{e},j2} \left\{ \begin{aligned} & c_W^2 s_W \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,1}^{\tilde{e},j1} \right) + \\ & 4 U_{s4,1}^{\tilde{e},j1} \left(\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W) \right) \end{aligned} \right\} \end{aligned} \right\} - \end{aligned} \right\} - \\ & 2 c_W^2 s_W^3 U_{s2,2}^{\tilde{e},j2} U_{s4,1}^{\tilde{e},j1} \left(\delta Z_{1,s3}^{\tilde{e},j3} U_{1,2}^{\tilde{e},j2*} + \delta Z_{2,s3}^{\tilde{e},j3} U_{2,2}^{\tilde{e},j2*} \right) \end{aligned} \right\} + \\ & \delta \bar{Z}_{1,s2}^{\tilde{e},j2} \left(c_\beta^3 c_W^2 M_W^4 s_W^3 U_{1,2}^{\tilde{e},j2} U_{s4,1}^{\tilde{e},j1} - c_\beta c_W^4 m_{e1} m_{e2} M_W^2 s_W U_{1,1}^{\tilde{e},j2} U_{s4,2}^{\tilde{e},j1} \right) + \\ & \delta \bar{Z}_{2,s2}^{\tilde{e},j2} \left(c_\beta^3 c_W^2 M_W^4 s_W^3 U_{2,2}^{\tilde{e},j2} U_{s4,1}^{\tilde{e},j1} - c_\beta c_W^4 m_{e1} m_{e2} M_W^2 s_W U_{2,1}^{\tilde{e},j2} U_{s4,2}^{\tilde{e},j1} \right) - \\ & 2 U_{s3,2}^{\tilde{e},j2*} \left\{ \begin{aligned} & c_W^4 U_{s2,1}^{\tilde{e},j2} \left\{ \begin{aligned} & c_\beta \left\{ \begin{aligned} & m_{e1} m_{e2} M_W^2 s_W \left(\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,2}^{\tilde{e},j1} \right) + \\ & 2 U_{s4,2}^{\tilde{e},j1} \left\{ \begin{aligned} & \delta m_{j2}^e m_{e1} M_W^2 s_W + \\ & m_{e2} \left(\delta m_{j1}^e M_W^2 s_W - m_{e1} (2 \delta s_W M_W^2 + \delta M_W^2 s_W) \right) \end{aligned} \right\} \end{aligned} \right\} - \end{aligned} \right\} + \\ & 4 m_{e1} m_{e2} M_W^2 s_W U_{s4,2}^{\tilde{e},j1} (\delta c_\beta - c_\beta \delta Z_e) \end{aligned} \right\} \end{aligned} \right\} - \\ & c_\beta^3 M_W^4 s_W^3 U_{s2,2}^{\tilde{e},j2} \left(4 U_{s4,1}^{\tilde{e},j1} (c_W^2 \delta Z_e + \delta s_W s_W) + c_W^2 (\delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,1}^{\tilde{e},j1}) \right) \end{aligned} \right\} + \\ & s_W U_{s2,1}^{\tilde{e},j2} \left\{ \begin{aligned} & c_\beta^3 c_W^2 M_W^4 U_{s4,1}^{\tilde{e},j1} \left(\delta Z_{1,s3}^{\tilde{e},j3} U_{1,1}^{\tilde{e},j2*} + \delta Z_{2,s3}^{\tilde{e},j3} U_{2,1}^{\tilde{e},j2*} \right) + \\ & 2 c_\beta c_W^4 m_{e1} m_{e2} M_W^2 U_{s4,2}^{\tilde{e},j1} \left(\delta Z_{1,s3}^{\tilde{e},j3} U_{1,2}^{\tilde{e},j2*} + \delta Z_{2,s3}^{\tilde{e},j3} U_{2,2}^{\tilde{e},j2*} \right) \end{aligned} \right\} \\ & s_W \left\{ \begin{aligned} & \delta \bar{Z}_{1,s4}^{\tilde{e},j4} U_{1,1}^{\tilde{e},j3} \left(c_\beta^3 c_W^2 M_W^4 U_{s2,1}^{\tilde{e},j1} U_{s3,1}^{\tilde{e},j3*} + 2 c_\beta c_W^4 m_{e1} m_{e3} M_W^2 U_{s2,2}^{\tilde{e},j1} U_{s3,2}^{\tilde{e},j3*} \right) + \\ & c_\beta^3 c_W^2 M_W^4 U_{s2,1}^{\tilde{e},j1} \left(\delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{2,1}^{\tilde{e},j3} U_{s3,1}^{\tilde{e},j3*} - 2 \delta \bar{Z}_{1,s4}^{\tilde{e},j4} s_W U_{1,2}^{\tilde{e},j3} U_{s3,2}^{\tilde{e},j3*} \right) \end{aligned} \right\} - \\ & \delta \bar{Z}_{2,s4}^{\tilde{e},j4} U_{s3,2}^{\tilde{e},j3*} \left(2 c_\beta^3 c_W^2 M_W^4 s_W^3 U_{2,2}^{\tilde{e},j3} U_{s2,1}^{\tilde{e},j1} - 2 c_\beta c_W^4 m_{e1} m_{e3} M_W^2 s_W U_{2,1}^{\tilde{e},j3} U_{s2,2}^{\tilde{e},j1} \right) + \\ & c_\beta c_W^2 M_W^2 s_W \left\{ \begin{aligned} & c_\beta^2 M_W^2 U_{s3,1}^{\tilde{e},j3*} \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) + \\ & 2 c_W^2 m_{e1} m_{e3} U_{s3,2}^{\tilde{e},j3*} \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) \end{aligned} \right\} + \\ & 4 U_{s3,1}^{\tilde{e},j3*} \left(\delta s_W s_W^2 - c_W^2 (\delta s_W - \delta Z_e s_W) \right) + \end{aligned} \right\} + \end{aligned} \right\} +
\end{aligned}$$

$$C(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, \tilde{\nu}_{j3}, \tilde{\nu}_{j4}^\dagger) = -\frac{\mathbf{i} e^2}{8 s_W^3} \left\{ \begin{aligned} & 4 \delta s_W \left\{ \begin{aligned} & \frac{\delta_{j1,j2} \delta_{j3,j4} s_W^4}{c_W^4} \left(U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} - 2 U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} \right) + \\ & U_{s1,1}^{\tilde{e},j1*} \left(\delta_{j1,j2} \delta_{j3,j4} U_{s2,1}^{\tilde{e},j1} - 2 \delta_{j1,j4} \delta_{j2,j3} U_{s2,1}^{\tilde{e},j2} \right) - \\ & \frac{2 \delta_{j1,j4} \delta_{j2,j3} m_{e1} m_{e2} U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j2}}{c_\beta^2 M_W^2} \end{aligned} \right\} + \\ & \frac{1}{c_\beta^3 c_W^2 M_W^4} \left\{ \begin{aligned} & c_\beta^3 M_W^4 \left\{ U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{aligned} & \delta \bar{Z}_{1,s2}^{\tilde{e},j2} \left(2 c_W^2 \delta_{j1,j4} \delta_{j2,j3} U_{1,1}^{\tilde{e},j2} + \delta_{j1,j2} \delta_{j3,j4} U_{1,1}^{\tilde{e},j1} (1 - 2 c_W^2) \right) + \end{aligned} \right\} - \right\} + \\ & 2 \delta_{j1,j2} \delta_{j3,j4} s_W^2 U_{s1,2}^{\tilde{e},j1*} \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) \end{aligned} \right\} - \left\{ \begin{aligned} & c_W^2 \delta_{j1,j4} \delta_{j2,j3} U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{aligned} & 2 c_\beta \left\{ \begin{aligned} & m_{e1} m_{e2} M_W^2 \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j2} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j2} \right) + \\ & 2 U_{s2,2}^{\tilde{e},j2} \left(\delta m_{e1}^e m_{e1} M_W^2 - m_{e2} \left(\delta M_W^2 m_{e1} - \delta m_{j1}^e M_W^2 \right) \right) \end{aligned} \right\} - \end{aligned} \right\} \end{aligned} \right\} - \end{aligned} \right\} \\ & s_W \left\{ \begin{aligned} & \delta Z_{1,s1}^{\tilde{e},j1} \left\{ \begin{aligned} & \frac{\delta_{j1,j2} \delta_{j3,j4}}{c_W^2} \left(2 s_W^2 U_{1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} - U_{1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} (1 - 2 c_W^2) \right) - \\ & 2 \delta_{j1,j4} \delta_{j2,j3} \left(\frac{m_{e1} m_{e2} U_{1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j2}}{c_\beta^2 M_W^2} + U_{1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j2} \right) \end{aligned} \right\} - \\ & \delta Z_{2,s1}^{\tilde{e},j1} \left\{ \begin{aligned} & \frac{\delta_{j1,j2} \delta_{j3,j4}}{c_W^2} \left(2 s_W^2 U_{2,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} - U_{2,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} (1 - 2 c_W^2) \right) - \\ & 2 \delta_{j1,j4} \delta_{j2,j3} \left(\frac{m_{e1} m_{e2} U_{2,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j2}}{c_\beta^2 M_W^2} + U_{2,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j2} \right) \end{aligned} \right\} - \\ & \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j4} + 4 \delta Z_e + \delta Z_{1,1}^{\tilde{\nu},j3} \right) \left\{ \begin{aligned} & \frac{\delta_{j1,j2} \delta_{j3,j4}}{c_W^2} \left(2 s_W^2 U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} - U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} (1 - 2 c_W^2) \right) - \\ & 2 \delta_{j1,j4} \delta_{j2,j3} \left(\frac{m_{e1} m_{e2} U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j2}}{c_\beta^2 M_W^2} + U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j2} \right) \end{aligned} \right\} \end{aligned} \right\} \end{aligned} \right\} - \end{aligned} \right\}$$

$$C(\tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger, \tilde{\nu}_{j3}, \tilde{\nu}_{j4}^\dagger) = -\frac{\mathbf{i} e^2}{8 c_W^4 s_W^3} \left(\delta_{j1,j4} \delta_{j2,j3} + \delta_{j1,j2} \delta_{j3,j4} \right) \left(4 \delta s_W s_W^2 - c_W^2 \left(4 (\delta s_W - \delta Z_e s_W) - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta \bar{Z}_{1,1}^{\tilde{\nu},j4} + \delta Z_{1,1}^{\tilde{\nu},j1} + \delta Z_{1,1}^{\tilde{\nu},j3} \right) \right) \right)$$

$$\begin{aligned}
& e^2 \left\{ \frac{4}{c_\beta^3 c_W^4 M_W^4 s_W^3} \left\{ c_W^4 \left\{ 18 \delta c_\beta m_{d_1} M_W^2 s_W \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} m_{d_2} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} U_{s4,2}^{\tilde{d},j1} + \\ & U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} U_{s4,1}^{\tilde{d},j1} \end{aligned} \right\} + \\ & \delta_{j1,j2} \delta_{j3,j4} m_{d_3} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} U_{s3,2}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} + \\ & U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} U_{s3,1}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \end{aligned} \right\} \end{aligned} \right\} + \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} m_{d_2} U_{s2,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} U_{s4,2}^{\tilde{d},j1} + \\ & \delta_{j1,j2} \delta_{j3,j4} m_{d_3} U_{s2,2}^{\tilde{d},j1} U_{s3,2}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} \end{aligned} \right\} + \\ & U_{s1,2}^{\tilde{d},j1*} \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} m_{d_2} U_{s2,2}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} U_{s4,1}^{\tilde{d},j1} + \\ & \delta_{j1,j2} \delta_{j3,j4} m_{d_3} U_{s2,1}^{\tilde{d},j1} U_{s3,1}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \end{aligned} \right\} \end{aligned} \right\} \right\} - \left\{ \begin{aligned} & U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} (\delta s_W s_W^2 - (c_W^2 + 8 c_W^4) (\delta s_W - \delta Z_e s_W)) + \\ & 2 s_W^3 U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} (c_W^2 \delta Z_e + \delta s_W s_W) \\ & U_{s2,1}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} (\delta s_W s_W^2 - (c_W^2 + 8 c_W^4) (\delta s_W - \delta Z_e s_W)) + \\ & 2 s_W^3 U_{s2,2}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} (c_W^2 \delta Z_e + \delta s_W s_W) \end{aligned} \right\} + \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} U_{s4,2}^{\tilde{d},j1} \left(U_{s2,1}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} + 2 U_{s2,2}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} \right) + \\ & \delta_{j1,j2} \delta_{j3,j4} U_{s2,2}^{\tilde{d},j1} \left(U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} + 2 U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \right) \end{aligned} \right\} \right\} + \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} \delta m_{j2}^d \left(U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} U_{s4,1}^{\tilde{d},j1} + U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} U_{s4,2}^{\tilde{d},j1} \right) + \\ & \delta_{j1,j2} \delta_{j3,j4} \delta m_{j3}^d \left(U_{s1,1}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} U_{s3,2}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} + U_{s1,2}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} U_{s3,1}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \right) \end{aligned} \right\} \right\} \\ & \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ \delta_{j1,j4} \delta_{j2,j3} \left\{ \frac{e^2}{c_\beta^2 c_W^2 M_W^2 s_W^2} \left\{ U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & 18 c_W^2 m_{d_1} m_{d_2} U_{1,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} U_{s4,2}^{\tilde{d},j1} + \\ & c_\beta^2 M_W^2 U_{s4,1}^{\tilde{d},j1} \left(2 s_W^2 U_{1,2}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} + U_{1,1}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} (1 + 8 c_W^2) \right) \right\} + \right\} + \left\{ \begin{aligned} & 9 c_W^2 m_{d_1} m_{d_2} U_{1,2}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} U_{s4,1}^{\tilde{d},j1} + \\ & c_\beta^2 M_W^2 s_W^2 U_{s4,2}^{\tilde{d},j1} \left(U_{1,1}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} + 2 U_{1,2}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} \right) \end{aligned} \right\} \right\} + \left\{ \begin{aligned} & 36 g_s^2 T_{o2,o3}^x T_{o4,o1}^x \left(U_{1,1}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} - U_{1,2}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} \right) \left(U_{s1,1}^{\tilde{d},j1*} U_{s4,1}^{\tilde{d},j1} - U_{s1,2}^{\tilde{d},j1*} U_{s4,2}^{\tilde{d},j1} \right) \end{aligned} \right\} \right\} + \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & 18 c_W^2 m_{d_1} m_{d_3} U_{1,2}^{\tilde{d},j1} U_{s3,2}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} + \\ & c_\beta^2 M_W^2 U_{1,1}^{\tilde{d},j1} \left(2 s_W^2 U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} + U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} (1 + 8 c_W^2) \right) \right\} + \right\} + \left\{ \begin{aligned} & 9 c_W^2 m_{d_1} m_{d_3} U_{1,1}^{\tilde{d},j1} U_{s3,1}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} + \\ & c_\beta^2 M_W^2 s_W^2 U_{1,2}^{\tilde{d},j1} \left(U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} + 2 U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \right) \end{aligned} \right\} \right\} + \left\{ \begin{aligned} & 36 g_s^2 T_{o2,o1}^x T_{o4,o3}^x \left(U_{1,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} - U_{1,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} \right) \left(U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} - U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \right) \end{aligned} \right\} \right\} - \left\{ \begin{aligned} & U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & 18 c_W^2 m_{d_1} m_{d_2} U_{2,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} U_{s4,2}^{\tilde{d},j1} + \\ & c_\beta^2 M_W^2 U_{s4,1}^{\tilde{d},j1} \left(2 s_W^2 U_{1,2}^{\tilde{d},j2} U_{s3,2}^{\tilde{d},j2*} + U_{1,1}^{\tilde{d},j2} U_{s3,1}^{\tilde{d},j2*} (1 + 8 c_W^2) \right) \right\} + \right\} + \left\{ \begin{aligned} & 9 c_W^2 m_{d_1} m_{d_3} U_{1,1}^{\tilde{d},j1} U_{s3,1}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} + \\ & c_\beta^2 M_W^2 s_W^2 U_{1,2}^{\tilde{d},j1} \left(U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} + 2 U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \right) \end{aligned} \right\} \right\} + \left\{ \begin{aligned} & 36 g_s^2 T_{o2,o1}^x T_{o4,o3}^x \left(U_{1,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} - U_{1,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} \right) \left(U_{s3,1}^{\tilde{d},j3*} U_{s4,1}^{\tilde{d},j3} - U_{s3,2}^{\tilde{d},j3*} U_{s4,2}^{\tilde{d},j3} \right) \end{aligned} \right\} \right\} \right\}
\end{aligned}$$

$$\begin{aligned}
& e^2 \left\{ \frac{i}{M_W^4 s_{2\beta}^3 s_W^3} \left\{ U_{s3,1}^{\tilde{u},j3*} \left\{ M_W^4 s_{2\beta}^3 U_{s1,1}^{\tilde{d},j1*} \left\{ \delta_{j1,j2} \delta_{j3,j4} \delta s_W U_{s2,1}^{\tilde{d},j1} U_{s4,1}^{\tilde{u},j3} - \right. \right. \right. \right. \\
& \left. \left. \left. U_{s2,1}^{\tilde{d},j2} U_{s4,1}^{\tilde{u},j4} \left\{ \text{CKM}_{j4,j1} \left(2 \delta s_W \text{CKM}_{j3,j2}^* - \delta \text{CKM}_{j3,j2}^* s_W \right) - \right\} \right\} \right. \right. \\
& \left. \left. \left. 4 s_{\beta}^2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j2} U_{s4,1}^{\tilde{u},j4} \left\{ \text{CKM}_{j4,j1} \left\{ \text{CKM}_{j3,j2}^* \left\{ \delta \text{CKM}_{j4,j1} m_{d_1} m_{d_2} M_W^2 \text{CKM}_{j3,j2}^* s_{2\beta} s_W + \right. \right. \right. \right. \right. \right. \\
& \left. \left. \left. \delta \text{CKM}_{j3,j2}^* m_{d_1} m_{d_2} M_W^2 s_{2\beta} s_W + \right. \right. \right. \left. \left. \left. \delta m_{j2}^d m_{d_1} M_W^2 s_{2\beta} s_W + \right. \right. \right. \\
& \left. \left. \left. m_{d_2} \left\{ \delta m_{j1}^d M_W^2 s_{2\beta} s_W - \right. \right. \right. \left. \left. \left. m_{d_1} \left\{ \delta c_{\beta} M_W^2 s_{\beta} s_W + \right. \right. \right. \right. \\
& \left. \left. \left. s_{2\beta} (2 \delta s_W M_W^2 + \delta M_W^2 s_W) \right\} \right\} \right\} \right\} + \\
& \left. \left. \left. 4 c_{\beta}^2 U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j4} \left\{ \text{CKM}_{j4,j1} \left\{ \text{CKM}_{j3,j2}^* \left\{ \delta \text{CKM}_{j4,j1} m_{u_{j3}} m_{u_{j4}} M_W^2 \text{CKM}_{j3,j2}^* s_{2\beta} s_W + \right. \right. \right. \right. \right. \right. \\
& \left. \left. \left. \delta \text{CKM}_{j3,j2}^* m_{u_{j3}} m_{u_{j4}} M_W^2 s_{2\beta} s_W + \right. \right. \right. \left. \left. \left. \delta m_{j4}^u m_{u_{j3}} M_W^2 s_{2\beta} s_W + \right. \right. \right. \\
& \left. \left. \left. m_{u_{j4}} \left\{ \delta m_{j3}^u M_W^2 s_{2\beta} s_W - \right. \right. \right. \left. \left. \left. m_{u_{j3}} (\delta M_W^2 s_{2\beta} s_W + M_W^2 (2 \delta s_W s_{2\beta} + 4 c_{\beta} \delta s_{\beta} s_W)) \right\} \right\} \right\} \right\} \right\} + \\
& \left. \left. \left. \frac{i \delta Z_e}{9 s_W^2} \left\{ \frac{\delta_{j1,j2} \delta_{j3,j4}}{c_W^2} \left\{ 4 s_W^2 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \left(U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} + 2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \right) - \right. \right. \right. \right. \\
& \left. \left. \left. U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} \left(2 s_W^2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} + U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} (1 - 10 c_W^2) \right) \right\} - \right. \right. \\
& \left. \left. \left. \frac{18 \text{CKM}_{j3,j2}^* \text{CKM}_{j4,j1}}{M_W^2 s_{2\beta}^2} \left\{ 4 c_{\beta}^2 m_{u_{j3}} m_{u_{j4}} U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j2} U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j4} + \right. \right. \right. \\
& \left. \left. \left. U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j4} \left(M_W^2 s_{2\beta}^2 U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j2} + 4 m_{d_1} m_{d_2} s_{\beta}^2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j2} \right) \right\} \right\} \right\} \\
& \left. \left. \left. \delta \bar{Z}_{1,s2}^{\tilde{d},j2} \left\{ \delta_{j1,j2} \delta_{j3,j4} \left\{ \frac{i e^2}{36 c_W^2 s_W^2} \left\{ 4 s_W^2 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \left(U_{1,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} + 2 U_{1,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} \right) - \right. \right. \right. \right. \right. \right. \\
& \left. \left. \left. U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} \left(2 s_W^2 U_{1,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} + U_{1,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} (1 - 10 c_W^2) \right) \right\} - \right. \right. \right. \\
& \left. \left. \left. i g_s^2 T_{o2,o1}^x T_{o4,o3}^x \left(U_{1,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} - U_{1,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} \right) \left(U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \right) \right\} - \right. \right. \\
& \left. \left. \left. \frac{2 i e^2 \text{CKM}_{j3,j2}^* \text{CKM}_{j4,j1}}{M_W^2 s_{2\beta}^2 s_W^2} \left\{ \frac{c_{\beta}^2 m_{u_{j3}} m_{u_{j4}}}{4} U_{1,1}^{\tilde{d},j2} U_{s1,1}^{\tilde{d},j1*} U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j4} + \right. \right. \right. \\
& \left. \left. \left. \frac{U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j4}}{4} \left(M_W^2 s_{2\beta}^2 U_{1,1}^{\tilde{d},j2} U_{s1,1}^{\tilde{d},j1*} + 4 m_{d_1} m_{d_2} s_{\beta}^2 U_{1,2}^{\tilde{d},j2} U_{s1,2}^{\tilde{d},j1*} \right) \right\} \right\} \right\} - \\
& \left. \left. \left. \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \left\{ \delta_{j1,j2} \delta_{j3,j4} \left\{ \frac{i e^2}{36 c_W^2 s_W^2} \left\{ 4 s_W^2 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \left(U_{2,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} + 2 U_{2,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} \right) - \right. \right. \right. \right. \right. \right. \\
& \left. \left. \left. U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} \left(2 s_W^2 U_{2,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} + U_{2,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} (1 - 10 c_W^2) \right) \right\} - \right. \right. \right. \\
& \left. \left. \left. i g_s^2 T_{o2,o1}^x T_{o4,o3}^x \left(U_{2,1}^{\tilde{d},j1} U_{s1,1}^{\tilde{d},j1*} - U_{2,2}^{\tilde{d},j1} U_{s1,2}^{\tilde{d},j1*} \right) \left(U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \right) \right\} - \right. \right. \\
& \left. \left. \left. \frac{2 i e^2 \text{CKM}_{j3,j2}^* \text{CKM}_{j4,j1}}{M_W^2 s_{2\beta}^2 s_W^2} \left\{ \frac{c_{\beta}^2 m_{u_{j3}} m_{u_{j4}}}{4} U_{2,1}^{\tilde{d},j2} U_{s1,1}^{\tilde{d},j1*} U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j4} + \right. \right. \right. \\
& \left. \left. \left. \frac{U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j4}}{4} \left(M_W^2 s_{2\beta}^2 U_{2,1}^{\tilde{d},j2} U_{s1,1}^{\tilde{d},j1*} + 4 m_{d_1} m_{d_2} s_{\beta}^2 U_{2,2}^{\tilde{d},j2} U_{s1,2}^{\tilde{d},j1*} \right) \right\} \right\} \right\} - \\
& \left. \left. \left. \delta_{j1,j2} \delta_{j3,j4} \left\{ \frac{i e^2}{36 c_W^2 s_W^2} \left\{ 4 s_W^2 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \left(U_{1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} + 2 U_{1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} \right) - \right. \right. \right. \right. \right. \right. \\
& \left. \left. \left. U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} \left(2 s_W^2 U_{1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} + U_{1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} (1 - 10 c_W^2) \right) \right\} - \right. \right. \right. \\
& \left. \left. \left. \left(U_{1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j$$

$$\begin{aligned}
& e^2 \left\{ \frac{4}{c_W^4 M_W^4 s_\beta^3 s_W^3} \left\{ c_W^4 \left\{ 18 \delta s_\beta m_{u_1} M_W^2 s_W \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} m_{u_2} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} U_{s4,2}^{\tilde{u},j1} + \\ & U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} U_{s4,1}^{\tilde{u},j1} \\ & U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} U_{s3,2}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} + \\ & U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} U_{s3,1}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \end{aligned} \right\} + \end{aligned} \right\} - \right. \\
& \left. 9 s_\beta \left(\delta m_{j1}^u M_W^2 s_W - m_{u_1} (2 \delta s_W M_W^2 + s_W (\delta M_W^2 - 2 \delta Z_e M_W^2)) \right) \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} m_{u_2} U_{s2,1}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} U_{s4,2}^{\tilde{u},j1} + \\ & \delta_{j1,j2} \delta_{j3,j4} m_{u_3} U_{s2,2}^{\tilde{u},j1} U_{s3,2}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} \end{aligned} \right\} + \\ & U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} m_{u_2} U_{s2,2}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} U_{s4,1}^{\tilde{u},j1} + \\ & \delta_{j1,j2} \delta_{j3,j4} m_{u_3} U_{s2,1}^{\tilde{u},j1} U_{s3,1}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} \end{aligned} \right\} \end{aligned} \right\} + \end{aligned} \right\} \\
& \left\{ M_W^4 s_\beta^3 \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & \delta_{j1,j2} \delta_{j3,j4} U_{s2,1}^{\tilde{u},j1} \left\{ \begin{aligned} & U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} (\delta s_W s_W^2 - (c_W^2 + 8 c_W^4) (\delta s_W - \delta Z_e s_W)) - \\ & 4 s_W^3 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} (c_W^2 \delta Z_e + \delta s_W s_W) \end{aligned} \right\} + \\ & \delta_{j1,j4} \delta_{j2,j3} U_{s4,1}^{\tilde{u},j1} \left\{ \begin{aligned} & U_{s2,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} (\delta s_W s_W^2 - (c_W^2 + 8 c_W^4) (\delta s_W - \delta Z_e s_W)) - \\ & 4 s_W^3 U_{s2,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} (c_W^2 \delta Z_e + \delta s_W s_W) \end{aligned} \right\} - \end{aligned} \right\} + \\ & 4 s_W^3 U_{s1,2}^{\tilde{u},j1*} (c_W^2 \delta Z_e + \delta s_W s_W) \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} U_{s4,2}^{\tilde{u},j1} (U_{s2,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} - 4 U_{s2,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*}) + \\ & \delta_{j1,j2} \delta_{j3,j4} U_{s2,2}^{\tilde{u},j1} (U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - 4 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3}) \end{aligned} \right\} \end{aligned} \right\} \\
& \left. \frac{36 m_{u_1}}{M_W^2 s_\beta^2 s_W^2} \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} \delta m_{j2}^u (U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} U_{s4,1}^{\tilde{u},j1} + U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} U_{s4,2}^{\tilde{u},j1}) + \\ & \delta_{j1,j2} \delta_{j3,j4} \delta m_{j3}^u (U_{s1,1}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} U_{s3,2}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} + U_{s1,2}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} U_{s3,1}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3}) \end{aligned} \right\} \right\} \\
& \delta \bar{Z}_{1,s2}^{\tilde{u},j2} \left\{ \begin{aligned} & \delta_{j1,j4} \delta_{j2,j3} \left\{ \frac{e^2}{c_W^2 M_W^2 s_\beta^2 s_W^2} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & 18 c_W^2 m_{u_1} m_{u_2} U_{1,1}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} U_{s4,2}^{\tilde{u},j1} - \\ & M_W^2 s_\beta^2 U_{s4,1}^{\tilde{u},j1} (4 s_W^2 U_{1,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} - U_{1,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} (1 + 8 c_W^2)) \end{aligned} \right\} + \\ & 2 U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & 9 c_W^2 m_{u_1} m_{u_2} U_{1,2}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} U_{s4,1}^{\tilde{u},j1} - \\ & 2 M_W^2 s_\beta^2 s_W^2 U_{s4,2}^{\tilde{u},j1} (U_{1,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} - 4 U_{1,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*}) \end{aligned} \right\} \end{aligned} \right\} + \\ & 36 g_s^2 T_{o2,o3}^x T_{o4,o1}^x (U_{1,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} - U_{1,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*}) (U_{s1,1}^{\tilde{u},j1*} U_{s4,1}^{\tilde{u},j1} - U_{s1,2}^{\tilde{u},j1*} U_{s4,2}^{\tilde{u},j1}) \end{aligned} \right\} + \\
& \delta_{j1,j2} \delta_{j3,j4} \left\{ \frac{e^2}{c_W^2 M_W^2 s_\beta^2 s_W^2} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & 18 c_W^2 m_{u_1} m_{u_3} U_{1,2}^{\tilde{u},j1} U_{s3,2}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - \\ & M_W^2 s_\beta^2 U_{1,1}^{\tilde{u},j1} (4 s_W^2 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} - U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} (1 + 8 c_W^2)) \end{aligned} \right\} + \\ & 2 U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & 9 c_W^2 m_{u_1} m_{u_3} U_{1,1}^{\tilde{u},j1} U_{s3,1}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3} - \\ & 2 M_W^2 s_\beta^2 s_W^2 U_{1,2}^{\tilde{u},j1} (U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - 4 U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3}) \end{aligned} \right\} \end{aligned} \right\} + \\ & 36 g_s^2 T_{o2,o1}^x T_{o4,o3}^x (U_{1,1}^{\tilde{u},j1} U_{s1,1}^{\tilde{u},j1*} - U_{1,2}^{\tilde{u},j1} U_{s1,2}^{\tilde{u},j1*}) (U_{s3,1}^{\tilde{u},j3*} U_{s4,1}^{\tilde{u},j3} - U_{s3,2}^{\tilde{u},j3*} U_{s4,2}^{\tilde{u},j3}) \end{aligned} \right\} + \\
& \delta_{j1,j4} \delta_{j2,j3} \left\{ \frac{e^2}{c_W^2 M_W^2 s_\beta^2 s_W^2} \left\{ \begin{aligned} & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & 18 c_W^2 m_{u_1} m_{u_2} U_{2,1}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} U_{s4,2}^{\tilde{u},j1} - \\ & M_W^2 s_\beta^2 U_{s4,1}^{\tilde{u},j1} (4 s_W^2 U_{2,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*} - U_{2,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} (1 + 8 c_W^2)) \end{aligned} \right\} + \\ & 2 U_{s1,2}^{\tilde{u},j1*} \left\{ \begin{aligned} & 9 c_W^2 m_{u_1} m_{u_2} U_{2,2}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} U_{s4,1}^{\tilde{u},j1} - \\ & 2 M_W^2 s_\beta^2 s_W^2 U_{s4,2}^{\tilde{u},j1} (U_{2,1}^{\tilde{u},j2} U_{s3,1}^{\tilde{u},j2*} - 4 U_{2,2}^{\tilde{u},j2} U_{s3,2}^{\tilde{u},j2*}) \end{aligned} \right\} \end{aligned} \right\} + \\ & 36 g_s^2 T_{o2,o1}^x T_{o4,o3}^x (U_{2,1}^{\tilde{u},j2} U_{s1,1}^{\tilde{u},j2*} - U_{2,2$$

[SSV] 2 Higgs – Gauge Boson

$$C_1(G^-, G^+, \gamma) = \frac{ie}{4} \left(4\delta Z_e + 2\delta Z_{\gamma\gamma} + 4\delta Z_{G^-G^-} + \delta Z_{Z\gamma} \left(\frac{c_W}{s_W} - \frac{s_W}{c_W} \right) \right)$$

$$C_2(G^-, G^+, Z) = -\frac{ie}{4c_W^3 s_W^2} \left\{ \begin{array}{l} 2\delta s_W s_W^4 + c_W^4 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + 2\delta Z_{G^-G^-})) - \\ s_W^2 (2c_W^3 \delta Z_{\gamma Z} - c_W^2 (4\delta s_W + s_W (2\delta Z_e + \delta Z_{ZZ} + 2\delta Z_{G^-G^-}))) \end{array} \right\}$$

$$C_3(G^0, G^-, W^+) = -\frac{e}{4s_W^2} (2\delta s_W - s_W (\delta \bar{Z}_W + 2\delta Z_e + \delta Z_{GG} + \delta Z_{G^-G^-}))$$

$$C_4(G^0, G^+, W^-) = -\frac{e}{4s_W^2} (2\delta s_W - s_W (2\delta Z_e + \delta Z_W + \delta Z_{GG} + \delta Z_{G^-G^-}))$$

$$C_{65}(h^0, A^0, Z) = \frac{e}{4c_W^3 s_W^2} (c_W^2 s_{\beta-\alpha} s_W (\delta Z_{AG} - \delta Z_{hH}) + c_{\beta-\alpha} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{AA} + \delta Z_{hh}))))$$

$$C_{66}(h^0, G^0, Z) = \frac{e}{4c_W^3 s_W^2} (2\delta s_W s_{\beta-\alpha} s_W^2 - c_W^2 (2\delta s_W s_{\beta-\alpha} - s_W (c_{\beta-\alpha} (\delta Z_{AG} + \delta Z_{hH}) + s_{\beta-\alpha} (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{GG} + \delta Z_{hh}))))$$

$$C_{67}(H^0, A^0, Z) = -\frac{e}{4c_W^3 s_W^2} (2\delta s_W s_{\beta-\alpha} s_W^2 - c_W^2 (2\delta s_W s_{\beta-\alpha} + s_W (c_{\beta-\alpha} (\delta Z_{AG} + \delta Z_{hH}) - s_{\beta-\alpha} (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{AA} + \delta Z_{HH}))))$$

$$C_{68}(H^0, G^0, Z) = -\frac{e}{4c_W^3 s_W^2} (c_W^2 s_{\beta-\alpha} s_W (\delta Z_{AG} - \delta Z_{hH}) - c_{\beta-\alpha} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{GG} + \delta Z_{HH}))))$$

$$C_{69}(H^-, H^+, \gamma) = \frac{ie}{4} \left(4\delta Z_e + 2\delta Z_{\gamma\gamma} + \delta Z_{Z\gamma} \left(\frac{c_W}{s_W} - \frac{s_W}{c_W} \right) + 2 (\delta \bar{Z}_{H^-H^-} + \delta Z_{H^-H^-}) \right)$$

$$C_{70}(H^-, H^+, Z) = -\frac{ie}{4c_W^3 s_W^2} \left\{ \begin{array}{l} 2\delta s_W s_W^4 + c_W^4 (2\delta s_W - s_W (\delta \bar{Z}_{H^-H^-} + 2\delta Z_e + \delta Z_{ZZ} + \delta Z_{H^-H^-})) - \\ s_W^2 (2c_W^3 \delta Z_{\gamma Z} - c_W^2 (4\delta s_W + s_W (\delta \bar{Z}_{H^-H^-} + 2\delta Z_e + \delta Z_{ZZ} + \delta Z_{H^-H^-}))) \end{array} \right\}$$

$$C_{71}(h^0, H^-, W^+) = \frac{ie}{4s_W^2} (c_{\beta-\alpha} (2\delta s_W - s_W (\delta \bar{Z}_W + 2\delta Z_e + \delta Z_{hh} + \delta Z_{H^-H^-})) + s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^-H^-}))$$

$$C_{72}(h^0, G^-, W^+) = \frac{ie}{4s_W^2} (2\delta s_W s_{\beta-\alpha} - s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{H^-G^-}) + s_{\beta-\alpha} (\delta \bar{Z}_W + 2\delta Z_e + \delta Z_{hh} + \delta Z_{G^-G^-})))$$

$$C_{73}(H^0, H^-, W^+) = -\frac{\mathbf{i}e}{4s_W^2} (2\delta s_W s_{\beta-\alpha} + s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^-H^-}) - s_{\beta-\alpha} (\delta \bar{Z}_W + 2\delta Z_e + \delta Z_{HH} + \delta Z_{H^-H^-})))$$

$$C_{74}(H^0, G^-, W^+) = \frac{\mathbf{i}e}{4s_W^2} (c_{\beta-\alpha} (2\delta s_W - s_W (\delta \bar{Z}_W + 2\delta Z_e + \delta Z_{HH} + \delta Z_{G^-G^-})) - s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{H^-G^-}))$$

$$C_{75}(h^0, H^+, W^-) = -\frac{\mathbf{i}e}{4s_W^2} (c_{\beta-\alpha} (2\delta s_W - s_W (\delta \bar{Z}_{H^-H^-} + 2\delta Z_e + \delta Z_W + \delta Z_{hh})) + s_{\beta-\alpha} s_W (\delta Z_{hh} - \delta Z_{G^-H^-}^*))$$

$$C_{76}(h^0, G^+, W^-) = -\frac{\mathbf{i}e}{4s_W^2} (2\delta s_W s_{\beta-\alpha} - s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^-H^-}) + s_{\beta-\alpha} (2\delta Z_e + \delta Z_W + \delta Z_{hh} + \delta Z_{G^-G^-})))$$

$$C_{77}(H^0, H^+, W^-) = \frac{\mathbf{i}e}{4s_W^2} (2\delta s_W s_{\beta-\alpha} + s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^-H^-}^*) - s_{\beta-\alpha} (\delta \bar{Z}_{H^-H^-} + 2\delta Z_e + \delta Z_W + \delta Z_{HH})))$$

$$C_{78}(H^0, G^+, W^-) = -\frac{\mathbf{i}e}{4s_W^2} (c_{\beta-\alpha} (2\delta s_W - s_W (2\delta Z_e + \delta Z_W + \delta Z_{HH} + \delta Z_{G^-G^-})) - s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^-H^-}))$$

$$C_{79}(A^0, H^-, W^+) = -\frac{e}{4s_W^2} (2\delta s_W - s_W (\delta \bar{Z}_W + 2\delta Z_e + \delta Z_{AA} + \delta Z_{H^-H^-}))$$

$$C_{80}(A^0, H^+, W^-) = -\frac{e}{4s_W^2} (2\delta s_W - s_W (\delta \bar{Z}_{H^-H^-} + 2\delta Z_e + \delta Z_W + \delta Z_{AA}))$$

$$C_{392}(H^-, G^+, \gamma) = \mathbf{i}e \delta Z_{G^-H^-}$$

$$C_{393}(H^+, G^-, \gamma) = \frac{\mathbf{i}e}{2} (\delta Z_{G^-H^-}^* + \delta Z_{H^-G^-})$$

$$C_{394}(H^-, G^+, Z) = -\frac{\mathbf{i}e \delta Z_{G^-H^-}}{2c_W s_W} (1 - 2c_W^2)$$

$$C_{395}(H^+, G^-, Z) = -\frac{\mathbf{i}e}{4c_W s_W} (1 - 2c_W^2) (\delta Z_{G^-H^-}^* + \delta Z_{H^-G^-})$$

$$C_{396}(A^0, G^-, W^+) = \frac{e}{4s_W} (\delta Z_{AG} + \delta Z_{H^-G^-})$$

$$C_{397}(A^0, G^+, W^-) = \frac{e}{4s_W} (\delta Z_{AG} + \delta Z_{G^-H^-})$$

$$C_{398}(G^0, H^-, W^+) = \frac{e}{4 s_W} (\delta Z_{AG} + \delta Z_{G^- H^-})$$

$$C_{399}(G^0, H^+, W^-) = \frac{e}{4 s_W} (\delta Z_{AG} + \delta Z_{G^+ H^-}^*)$$

$$C_{446}(h^0, A^0, \gamma) = \frac{e c_{\beta-\alpha} \delta Z_{Z\gamma}}{4 c_W s_W}$$

$$C_{447}(h^0, G^0, \gamma) = \frac{e \delta Z_{Z\gamma} s_{\beta-\alpha}}{4 c_W s_W}$$

$$C_{448}(H^0, A^0, \gamma) = -\frac{e \delta Z_{Z\gamma} s_{\beta-\alpha}}{4 c_W s_W}$$

$$C_{449}(H^0, G^0, \gamma) = \frac{e c_{\beta-\alpha} \delta Z_{Z\gamma}}{4 c_W s_W}$$

[SSV] 2 Sleptons – Gauge Boson

$$C_{236}(\tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger, Z) = -\frac{i e \delta_{j1,j2}}{4 c_W^3 s_W^2} \left(2 \delta s_W s_W^2 - c_W^2 \left(2 \delta s_W - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + 2 \delta Z_e + \delta Z_{ZZ} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \right)$$

$$C_{237}(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, \gamma) = \frac{i e \delta_{j1,j2}}{4 c_W s_W} \left\{ \begin{array}{l} 2 c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{e},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{e},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{e},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{e},j1} + \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma}) \right) - \\ \delta Z_{Z\gamma} \left(2 s_W^2 U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} - U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} (1 - 2 s_W^2) \right) \end{array} \right\}$$

$$C_{238}(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, Z) = \frac{i e \delta_{j1,j2}}{4 c_W^3 s_W^2} \left\{ \begin{array}{l} 2 c_W^3 \delta_{s1,s2} \delta Z_{\gamma Z} s_W^2 - \\ s_W \left\{ \begin{array}{l} c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) + \\ U_{s2,2}^{\tilde{e},j1} (2 \delta s_W s_W^2 + c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) \end{array} \right\} + \\ c_W^2 \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e},j1} (1 - 2 c_W^2) \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) + \\ 2 s_W^2 U_{s2,2}^{\tilde{e},j1} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) \end{array} \right\} \\ U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W^2 s_W (1 - 2 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \\ U_{s2,1}^{\tilde{e},j1} (\delta s_W (2 s_W^2 - 4 s_W^4) - c_W^2 (\delta s_W (6 - 4 c_W^2) + s_W (1 - 2 c_W^2) (2 \delta Z_e + \delta Z_{ZZ}))) \end{array} \right\} \end{array} \right\}$$

$$C_{245}(\tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}, W^-) = \frac{i e \delta_{j1,j2}}{2 \sqrt{2} s_W^2} \left(U_{s2,1}^{\tilde{e},j1} \left(2 \delta s_W - s_W \left(2 \delta Z_e + \delta Z_W + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) - s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) \right)$$

$$C_{246}(\tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger, W^+) = \frac{i e \delta_{j1,j2}}{2 \sqrt{2} s_W^2} \left(U_{s2,1}^{\tilde{e},j1*} \left(2 \delta s_W - s_W \left(\delta \bar{Z}_W + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 2 \delta Z_e \right) \right) - s_W \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) \right)$$

$$C_{400}(\tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger, \gamma) = -\frac{i e \delta_{j1,j2} \delta Z_{Z\gamma}}{4 c_W s_W}$$

[SSV] 2 Squarks – Gauge Boson

$$C_{239}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, \gamma) = -\frac{i e \delta_{j1,j2}}{12 c_W s_W} \left\{ \begin{aligned} & 4 c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{u},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{u},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{u},j1} + \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma}) \right) - \\ & \delta Z_{Z\gamma} \left(4 s_W^2 U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} - U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} (3 - 4 s_W^2) \right) \end{aligned} \right\}$$

$$C_{240}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, Z) = -\frac{i e \delta_{j1,j2}}{12 c_W^3 s_W^2} \left\{ \begin{aligned} & 4 c_W^3 \delta_{s1,s2} \delta Z_{\gamma Z} s_W^2 - \\ & s_W \left\{ \begin{aligned} & 4 s_W U_{s1,2}^{\tilde{u},j1*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} \right) + \right. \\ & \left. U_{s2,2}^{\tilde{u},j1} (2 \delta s_W s_W^2 + c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) \right\} + \end{aligned} \right\} - \\ & c_W^2 \left\{ \begin{aligned} & U_{s2,1}^{\tilde{u},j1} (1 - 4 c_W^2) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) + \\ & 4 s_W^2 U_{s2,2}^{\tilde{u},j1} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} \\ & U_{s1,1}^{\tilde{u},j1*} \left\{ \begin{aligned} & c_W^2 s_W (1 - 4 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) + \\ & U_{s2,1}^{\tilde{u},j1} (2 \delta s_W s_W^2 (1 - 4 c_W^2) + c_W^2 (\delta s_W (14 - 8 c_W^2) + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{ZZ}))) \end{aligned} \right\} \end{aligned} \right\}$$

$$C_{241}(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, \gamma) = \frac{i e \delta_{j1,j2}}{12 c_W s_W} \left\{ \begin{aligned} & 2 c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{d},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{d},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{d},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{d},j1} + \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma}) \right) - \\ & \delta Z_{Z\gamma} \left(2 s_W^2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} - U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} (3 - 2 s_W^2) \right) \end{aligned} \right\}$$

$$\begin{aligned}
C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, Z) &= \frac{i e \delta_{j1,j2}}{12 c_W^3 s_W^2} \left\{ \begin{aligned} &2 c_W^3 \delta_{s1,s2} \delta Z_{\gamma Z} s_W^2 - \\ &s_W \left\{ \begin{aligned} &2 s_W U_{s1,2}^{\tilde{d},j1*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} \right) + \right. \\ &\left. U_{s2,2}^{\tilde{d},j1} (2 \delta s_W s_W^2 + c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) \right\} - \end{aligned} \right\} + \\ &c_W^2 \left\{ \begin{aligned} &U_{s2,1}^{\tilde{d},j1} (1 + 2 c_W^2) \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) - \\ &2 s_W^2 U_{s2,2}^{\tilde{d},j1} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \\ &U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} &c_W^2 s_W (1 + 2 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) + \\ &U_{s2,1}^{\tilde{d},j1} (2 (\delta s_W s_W^2 + c_W^4 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) - c_W^2 (2 \delta s_W (5 - 2 s_W^2) - s_W (2 \delta Z_e + \delta Z_{ZZ}))) \end{aligned} \right\} \end{aligned} \right\} \\
C(\tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, W^-) &= -\frac{i e}{2 \sqrt{2} s_W^2} \left\{ \begin{aligned} &\text{CKM}_{j1,j2}^* \left\{ \begin{aligned} &s_W U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) - \\ &U_{s1,1}^{\tilde{u},j1*} \left(U_{s2,1}^{\tilde{d},j2} (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_W)) - s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) \right) \end{aligned} \right\} + \\ &2 \delta \text{CKM}_{j1,j2}^* s_W U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \end{aligned} \right\} \\
C(\tilde{d}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}, W^+) &= -\frac{i e}{2 \sqrt{2} s_W^2} \left\{ \begin{aligned} &\text{CKM}_{j1,j2} \left\{ \begin{aligned} &s_W U_{s1,1}^{\tilde{u},j1} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) - \\ &U_{s2,1}^{\tilde{d},j2*} \left(U_{s1,1}^{\tilde{u},j1} (2 \delta s_W - s_W (\delta \bar{Z}_W + 2 \delta Z_e)) - s_W \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) \right) \end{aligned} \right\} + \\ &2 \delta \text{CKM}_{j1,j2} s_W U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \end{aligned} \right\}
\end{aligned}$$

[SSV] 2 Squarks – Gluon

$$C(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, g) = -\frac{i g_s \delta_{j1,j2} T_{o2,o1}^{g1}}{2} \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{u},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{u},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{u},j1} + \delta_{s1,s2} (\delta Z_{gg} + 2 \delta Z_{g_s}) \right)$$

$$C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, g) = -\frac{i g_s \delta_{j1,j2} T_{o2,o1}^{g1}}{2} \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{d},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{d},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{d},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{d},j1} + \delta_{s1,s2} (\delta Z_{gg} + 2 \delta Z_{g_s}) \right)$$

[SSVV] 2 Higgs – 2 Gauge Bosons

$$C(h^0, h^0, Z, Z) = \frac{i e^2}{2 c_W^4 s_W^3} (2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{ZZ} + \delta Z_{hh})))$$

$$C(h^0, h^0, W^-, W^+) = -\frac{ie^2}{4s_W^3} (4\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_W + 2\delta Z_{hh}))$$

$$C(G^0, G^0, Z, Z) = \frac{ie^2}{2c_W^4 s_W^3} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{GG})))$$

$$C(G^0, G^0, W^-, W^+) = -\frac{ie^2}{4s_W^3} (4\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_W + 2\delta Z_{GG}))$$

$$C(G^-, G^+, \gamma, \gamma) = \frac{ie^2}{c_W s_W} (\delta Z_{Z\gamma} (c_W^2 - s_W^2) + 2c_W s_W (2\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{G^-G^-}))$$

$$C(G^-, G^+, \gamma, Z) = -\frac{ie^2}{4c_W^3 s_W^2} \left\{ \begin{aligned} &4\delta s_W s_W^4 - \delta Z_{Z\gamma} (c_W^5 + c_W s_W^4) + 2c_W^4 (2\delta s_W - s_W (4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ} + 2\delta Z_{G^-G^-})) + \\ &s_W^2 (2c_W^2 (4\delta s_W + s_W (4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ} + 2\delta Z_{G^-G^-})) - 2c_W^3 (2\delta Z_{\gamma Z} - \delta Z_{Z\gamma})) \end{aligned} \right\}$$

$$C(G^-, G^+, Z, Z) = \frac{ie^2}{2c_W^4 s_W^3} (1 - 2c_W^2) (2\delta s_W s_W^4 + c_W^4 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{G^-G^-})) - s_W^2 (2c_W^3 \delta Z_{\gamma Z} - c_W^2 (4\delta s_W + s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{G^-G^-}))))$$

$$C(G^-, G^+, W^-, W^+) = -\frac{ie^2}{4s_W^3} (4\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_W + 2\delta Z_{G^-G^-}))$$

$$C(h^0, H^-, \gamma, W^+) = -\frac{ie^2}{4c_W s_W^2} (c_W s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^-H^-}) + c_{\beta-\alpha} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{hh} + \delta Z_{H^-H^-}))))$$

$$C(h^0, G^-, \gamma, W^+) = -\frac{ie^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_{\beta-\alpha} s_W^2 + c_W (2\delta s_W s_{\beta-\alpha} - s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{H^-G^-}) + s_{\beta-\alpha} (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{hh} + \delta Z_{G^-G^-}))))$$

$$C(h^0, H^-, Z, W^+) = \frac{ie^2}{4c_W^3 s_W} (c_W^2 s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^-H^-}) + c_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{ZZ} + \delta Z_{hh} + \delta Z_{H^-H^-})))$$

$$C(h^0, G^-, Z, W^+) = \frac{ie^2}{4c_W^3 s_W} (s_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2) - c_W^2 s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{H^-G^-}) + s_{\beta-\alpha} (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{ZZ} + \delta Z_{hh} + \delta Z_{G^-G^-})))$$

$$C(h^0, H^+, \gamma, W^-) = -\frac{ie^2}{4c_W s_W^2} (c_W s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^-H^-}^*) + c_{\beta-\alpha} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{hh}))))$$

$$C(h^0, G^+, \gamma, W^-) = -\frac{ie^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_{\beta-\alpha} s_W^2 + c_W (2\delta s_W s_{\beta-\alpha} - s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^-H^-}) + s_{\beta-\alpha} (4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{hh} + \delta Z_{G^-G^-}))))$$

$$C(h^0, H^+, Z, W^-) = \frac{ie^2}{4c_W^3 s_W} (c_W^2 s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^+H^-}^*) + c_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (\delta \bar{Z}_{H^+H^-} + 4\delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{hh})))$$

$$C(h^0, G^+, Z, W^-) = \frac{ie^2}{4c_W^3 s_W} (s_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2) - c_W^2 s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^+H^-}) + s_{\beta-\alpha} (4\delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{hh} + \delta Z_{G^+G^-})))$$

$$C(H^0, H^0, Z, Z) = \frac{ie^2}{2c_W^4 s_W^3} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{HH})))$$

$$C(H^0, H^0, W^-, W^+) = -\frac{ie^2}{4s_W^3} (4\delta s_W - s_W (\delta \bar{Z}_W + 4\delta Z_e + \delta Z_W + 2\delta Z_{HH}))$$

$$C(H^0, H^-, \gamma, W^+) = \frac{ie^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_{\beta-\alpha} s_W^2 + c_W (2\delta s_W s_{\beta-\alpha} + s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^+H^-}) - s_{\beta-\alpha} (\delta \bar{Z}_W + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{HH} + \delta Z_{H^+H^-}))))$$

$$C(H^0, G^-, \gamma, W^+) = \frac{ie^2}{4c_W s_W^2} (c_W s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{H^+G^-}) - c_{\beta-\alpha} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (\delta \bar{Z}_W + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{HH} + \delta Z_{G^+G^-}))))$$

$$C(H^0, H^-, Z, W^+) = -\frac{ie^2}{4c_W^3 s_W} (s_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2) + c_W^2 s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^+H^-}) - s_{\beta-\alpha} (\delta \bar{Z}_W + 4\delta Z_e + \delta Z_{ZZ} + \delta Z_{HH} + \delta Z_{H^+H^-})))$$

$$C(H^0, G^-, Z, W^+) = -\frac{ie^2}{4c_W^3 s_W} (c_W^2 s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{H^+G^-}) - c_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (\delta \bar{Z}_W + 4\delta Z_e + \delta Z_{ZZ} + \delta Z_{HH} + \delta Z_{G^+G^-})))$$

$$C(H^0, H^+, \gamma, W^-) = \frac{ie^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_{\beta-\alpha} s_W^2 + c_W (2\delta s_W s_{\beta-\alpha} + s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^+H^-}^*) - s_{\beta-\alpha} (\delta \bar{Z}_{H^+H^-} + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{HH}))))$$

$$C(H^0, G^+, \gamma, W^-) = \frac{ie^2}{4c_W s_W^2} (c_W s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^+H^-}) - c_{\beta-\alpha} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{HH} + \delta Z_{G^+G^-}))))$$

$$C(H^0, H^+, Z, W^-) = -\frac{ie^2}{4c_W^3 s_W} (s_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2) + c_W^2 s_W (c_{\beta-\alpha} (\delta Z_{hH} + \delta Z_{G^+H^-}^*) - s_{\beta-\alpha} (\delta \bar{Z}_{H^+H^-} + 4\delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{HH})))$$

$$C(H^0, G^+, Z, W^-) = -\frac{ie^2}{4c_W^3 s_W} (c_W^2 s_{\beta-\alpha} s_W (\delta Z_{hH} - \delta Z_{G^+H^-}) - c_{\beta-\alpha} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (4\delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{HH} + \delta Z_{G^+G^-})))$$

$$C(A^0, A^0, Z, Z) = \frac{ie^2}{2c_W^4 s_W^3} (2\delta s_W s_W^2 - c_W^2 (2\delta s_W - s_W (2\delta Z_e + \delta Z_{ZZ} + \delta Z_{AA})))$$

$$C_{170}(A^0, A^0, W^-, W^+) = -\frac{\mathbf{i}e^2}{4s_W^3} (4\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_W + 2\delta Z_{AA}))$$

$$C_{171}(A^0, H^-, \gamma, W^+) = \frac{e^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{AA} + \delta Z_{H^-H^-})))$$

$$C_{172}(A^0, H^-, Z, W^+) = -\frac{e^2}{4c_W^3 s_W} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{ZZ} + \delta Z_{AA} + \delta Z_{H^-H^-}))$$

$$C_{173}(A^0, H^+, \gamma, W^-) = -\frac{e^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{AA})))$$

$$C_{174}(A^0, H^+, Z, W^-) = \frac{e^2}{4c_W^3 s_W} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{AA}))$$

$$C_{175}(G^0, G^-, \gamma, W^+) = \frac{e^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{GG} + \delta Z_{G^-G^-})))$$

$$C_{176}(G^0, G^-, Z, W^+) = -\frac{e^2}{4c_W^3 s_W} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (\delta\bar{Z}_W + 4\delta Z_e + \delta Z_{ZZ} + \delta Z_{GG} + \delta Z_{G^-G^-}))$$

$$C_{177}(G^0, G^+, \gamma, W^-) = -\frac{e^2}{4c_W s_W^2} (\delta Z_{Z\gamma} s_W^2 + c_W (2\delta s_W - s_W (4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{GG} + \delta Z_{G^-G^-})))$$

$$C_{178}(G^0, G^+, Z, W^-) = \frac{e^2}{4c_W^3 s_W} (c_W^3 \delta Z_{\gamma Z} - 2\delta s_W s_W^2 - c_W^2 s_W (4\delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{GG} + \delta Z_{G^-G^-}))$$

$$C_{179}(H^-, H^+, \gamma, \gamma) = \frac{\mathbf{i}e^2}{c_W s_W} (\delta Z_{Z\gamma} (c_W^2 - s_W^2) + c_W s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + 2\delta Z_{\gamma\gamma} + \delta Z_{H^-H^-}))$$

$$C_{180}(H^-, H^+, \gamma, Z) = -\frac{\mathbf{i}e^2}{4c_W^3 s_W^2} \left\{ 4\delta s_W s_W^4 - \delta Z_{Z\gamma} (c_W^5 + c_W s_W^4) + 2c_W^4 (2\delta s_W - s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ} + \delta Z_{H^-H^-})) + \right. \\ \left. s_W^2 (2c_W^2 (4\delta s_W + s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ} + \delta Z_{H^-H^-})) - 2c_W^3 (2\delta Z_{\gamma Z} - \delta Z_{Z\gamma})) \right\}$$

$$C_{181}(H^-, H^+, Z, Z) = \frac{\mathbf{i}e^2}{4c_W^4 s_W^3} (1 - 2c_W^2) \left\{ 4\delta s_W s_W^4 + c_W^4 (4\delta s_W - s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + 2\delta Z_{ZZ} + \delta Z_{H^-H^-})) - \right. \\ \left. s_W^2 (4c_W^3 \delta Z_{\gamma Z} - c_W^2 (8\delta s_W + s_W (\delta\bar{Z}_{H^-H^-} + 4\delta Z_e + 2\delta Z_{ZZ} + \delta Z_{H^-H^-}))) \right\}$$

$$C_{182}(H^-, H^+, W^-, W^+) = -\frac{\mathbf{i}e^2}{4s_W^3} (4\delta s_W - s_W (\delta\bar{Z}_W + \delta\bar{Z}_{H^-H^-} + 4\delta Z_e + \delta Z_W + \delta Z_{H^-H^-}))$$

[SSVV] 2 Sleptons – 2 Gauge Bosons

$$C(\tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger, Z, Z) = \frac{i e^2 \delta_{j1,j2}}{4 c_W^4 s_W^3} \left(4 \delta s_W s_W^2 - c_W^2 \left(4 \delta s_W - s_W \left(\delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + \delta Z_{1,1}^{\tilde{\nu},j1} + 2 (2 \delta Z_e + \delta Z_{ZZ}) \right) \right) \right) \quad 352$$

$$C(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, \gamma, \gamma) = \frac{i e^2 \delta_{j1,j2}}{c_W s_W} \left\{ \begin{array}{l} c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{e},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{e},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{e},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{e},j1} + 2 \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma}) \right) - \\ \delta Z_{Z\gamma} \left(2 s_W^2 U_{s1,2}^{\tilde{e},j1*} U_{s2,2}^{\tilde{e},j1} - U_{s1,1}^{\tilde{e},j1*} U_{s2,1}^{\tilde{e},j1} (1 - 2 s_W^2) \right) \end{array} \right\}$$

$$C(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, \gamma, Z) = \frac{i e^2 \delta_{j1,j2}}{4 c_W^3 s_W^2} \left\{ \begin{array}{l} 4 c_W^3 \delta_{s1,s2} \delta Z_{\gamma Z} s_W^2 - \\ 2 s_W \left\{ \begin{array}{l} c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) + \\ U_{s2,2}^{\tilde{e},j1} \left(s_W^2 (2 \delta s_W - c_W \delta Z_{Z\gamma}) + c_W^2 (2 \delta s_W + s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ})) \right) \end{array} \right\} + \\ c_W^2 \left\{ \begin{array}{l} U_{s2,1}^{\tilde{e},j1} (1 - 2 c_W^2) \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) + \\ 2 s_W^2 U_{s2,2}^{\tilde{e},j1} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) \end{array} \right\} \\ U_{s1,1}^{\tilde{e},j1*} \left\{ \begin{array}{l} 2 c_W^2 s_W (1 - 2 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - \\ U_{s2,1}^{\tilde{e},j1} \left(c_W (1 - 2 c_W^2)^2 \delta Z_{Z\gamma} + \delta s_W (4 s_W^2 - 8 s_W^4) - 2 c_W^2 (\delta s_W (6 - 4 c_W^2) + s_W (1 - 2 c_W^2) (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ})) \right) \end{array} \right\} \end{array} \right\}$$

$$C(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, Z, Z) = \frac{i e^2 \delta_{j1,j2}}{4 c_W^4 s_W^3} \left\{ \begin{array}{l} s_W \left\{ \begin{array}{l} 4 s_W^3 U_{s1,2}^{\tilde{e},j1*} \left\{ \begin{array}{l} c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,2}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,2}^{\tilde{e},j1} \right) - \\ 2 U_{s2,2}^{\tilde{e},j1} (c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) \end{array} \right\} + \\ c_W^2 \left\{ \begin{array}{l} (1 - 2 c_W^2)^2 U_{s2,1}^{\tilde{e},j1} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) + \\ 4 s_W^4 U_{s2,2}^{\tilde{e},j1} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,2}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,2}^{\tilde{e},j1*} \right) \end{array} \right\} \end{array} \right\} + \\ U_{s1,1}^{\tilde{e},j1*} (1 - 2 c_W^2) \left\{ \begin{array}{l} c_W^2 s_W (1 - 2 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) + \\ 2 U_{s2,1}^{\tilde{e},j1} (4 \delta s_W s_W^4 - 2 s_W^2 (\delta s_W + c_W^3 \delta Z_{\gamma Z}) + c_W^2 (\delta s_W (6 - 4 c_W^2) + s_W (1 - 2 c_W^2) (2 \delta Z_e + \delta Z_{ZZ}))) \end{array} \right\} \end{array} \right\}$$

$$C(\tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}, \gamma, W^-) = \frac{i e^2 \delta_{j1,j2}}{2 \sqrt{2} c_W s_W^2} \left(U_{s2,1}^{\tilde{e},j1} \left(\delta Z_{Z\gamma} s_W^2 + c_W \left(2 \delta s_W - s_W \left(4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \right) - c_W s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) \right) \quad 364$$

$$C(\tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger, \gamma, W^+) = \frac{i e^2 \delta_{j1,j2}}{2 \sqrt{2} c_W s_W^2} \left(U_{s2,1}^{\tilde{e},j1*} \left(\delta Z_{Z\gamma} s_W^2 + c_W \left(2 \delta s_W - s_W \left(\delta \bar{Z}_W + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 4 \delta Z_e + \delta Z_{\gamma\gamma} \right) \right) \right) - c_W s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) \right) \quad 365$$

$$C_{368}(\tilde{\nu}_{j1}, \tilde{e}_{j2}^{s2,\dagger}, Z, W^-) = \frac{i e^2 \delta_{j1,j2}}{2 \sqrt{2} c_W^3 s_W} \left(c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) - U_{s2,1}^{\tilde{e},j1} \left(c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 s_W \left(4 \delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right) \right)$$

$$C_{369}(\tilde{e}_{j2}^{s2}, \tilde{\nu}_{j1}^\dagger, Z, W^+) = \frac{i e^2 \delta_{j1,j2}}{2 \sqrt{2} c_W^3 s_W} \left(c_W^2 s_W \left(\delta Z_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1*} \right) - U_{s2,1}^{\tilde{e},j1*} \left(c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 s_W \left(\delta \bar{Z}_W + \delta \bar{Z}_{1,1}^{\tilde{\nu},j1} + 4 \delta Z_e + \delta Z_{ZZ} \right) \right) \right)$$

$$C_{370}(\tilde{\nu}_{j1}, \tilde{\nu}_{j2}^\dagger, W^-, W^+) = -\frac{i e^2 \delta_{j1,j2}}{4 s_W^3} \left(4 \delta s_W - s_W \left(\delta \bar{Z}_W + \delta \bar{Z}_{1,1}^{\tilde{\nu},j2} + 4 \delta Z_e + \delta Z_W + \delta Z_{1,1}^{\tilde{\nu},j1} \right) \right)$$

$$C_{371}(\tilde{e}_{j1}^{s1}, \tilde{e}_{j2}^{s2,\dagger}, W^-, W^+) = \frac{i e^2 \delta_{j1,j2}}{4 s_W^3} \left\{ s_W U_{s2,1}^{\tilde{e},j1} \left(\delta Z_{1,s1}^{\tilde{e},j1} U_{1,1}^{\tilde{e},j1*} + \delta Z_{2,s1}^{\tilde{e},j1} U_{2,1}^{\tilde{e},j1*} \right) - U_{s1,1}^{\tilde{e},j1*} \left(U_{s2,1}^{\tilde{e},j1} \left(4 \delta s_W - s_W \left(\delta \bar{Z}_W + 4 \delta Z_e + \delta Z_W \right) \right) - s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{e},j2} U_{1,1}^{\tilde{e},j1} + \delta \bar{Z}_{2,s2}^{\tilde{e},j2} U_{2,1}^{\tilde{e},j1} \right) \right) \right\}$$

[SSVV] 2 Squarks – 2 Gauge Bosons

$$C_{356}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, \gamma, \gamma) = \frac{2 i e^2 \delta_{j1,j2}}{9 c_W s_W} \left\{ 2 c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{u},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{u},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{u},j1} + \delta_{s1,s2} (4 \delta Z_e + 2 \delta Z_{\gamma\gamma}) \right) - \delta Z_{Z\gamma} \left(4 s_W^2 U_{s1,2}^{\tilde{u},j1*} U_{s2,2}^{\tilde{u},j1} - U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} (3 - 4 s_W^2) \right) \right\}$$

$$C_{357}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, \gamma, Z) = \frac{i e^2 \delta_{j1,j2}}{36 c_W^3 s_W^2} \left\{ 16 c_W^3 \delta_{s1,s2} \delta Z_{\gamma Z} s_W^2 - 4 s_W \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} \right) + U_{s2,2}^{\tilde{u},j1} \left(s_W^2 (2 \delta s_W - c_W \delta Z_{Z\gamma}) + c_W^2 (2 \delta s_W + s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ})) \right) \right\} + c_W^2 \left\{ U_{s2,1}^{\tilde{u},j1} (1 - 4 c_W^2) \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) + 4 s_W^2 U_{s2,2}^{\tilde{u},j1} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \right\} - U_{s1,1}^{\tilde{u},j1*} \left\{ 4 c_W^2 s_W (1 - 4 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) - U_{s2,1}^{\tilde{u},j1} \left(c_W (1 - 4 c_W^2)^2 \delta Z_{\gamma Z} - 8 \delta s_W s_W^2 (1 - 4 c_W^2) - 4 c_W^2 (\delta s_W (14 - 8 c_W^2) + s_W (1 - 4 c_W^2) (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ})) \right) \right\} \right\}$$

$$C(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, Z, Z) = \frac{i e^2 \delta_{j1,j2}}{36 c_W^4 s_W^3} \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & 16 s_W^3 U_{s1,2}^{\tilde{u},j1*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,2}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,2}^{\tilde{u},j1} \right) - \right. \\ & \left. 2 U_{s2,2}^{\tilde{u},j1} (c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) \right\} + \end{aligned} \right\} + \\ & c_W^2 \left\{ \begin{aligned} & (1 - 4 c_W^2)^2 U_{s2,1}^{\tilde{u},j1} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) + \\ & 16 s_W^4 U_{s2,2}^{\tilde{u},j1} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,2}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,2}^{\tilde{u},j1*} \right) \end{aligned} \right\} \\ & U_{s1,1}^{\tilde{u},j1*} (1 - 4 c_W^2) \left\{ c_W^2 s_W (1 - 4 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) + \right. \\ & \left. 2 U_{s2,1}^{\tilde{u},j1} (8 \delta s_W s_W^4 - s_W^2 (6 \delta s_W + 4 c_W^3 \delta Z_{\gamma Z}) + c_W^2 (\delta s_W (14 - 8 c_W^2) + s_W (1 - 4 c_W^2) (2 \delta Z_e + \delta Z_{ZZ}))) \right\} \end{aligned} \right\}$$

$$C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, \gamma, \gamma) = \frac{i e^2 \delta_{j1,j2}}{9 c_W s_W} \left\{ \begin{aligned} & c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{d},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{d},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{d},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{d},j1} + 2 \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma}) \right) - \\ & \delta Z_{Z\gamma} \left(2 s_W^2 U_{s1,2}^{\tilde{d},j1*} U_{s2,2}^{\tilde{d},j1} - U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} (3 - 2 s_W^2) \right) \end{aligned} \right\}$$

$$C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, \gamma, Z) = \frac{i e^2 \delta_{j1,j2}}{36 c_W^3 s_W^2} \left\{ \begin{aligned} & 4 c_W^3 \delta_{s1,s2} \delta Z_{\gamma Z} s_W^2 - \\ & 2 s_W \left\{ \begin{aligned} & 2 s_W U_{s1,2}^{\tilde{d},j1*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} \right) + \right. \\ & \left. U_{s2,2}^{\tilde{d},j1} (s_W^2 (2 \delta s_W - c_W \delta Z_{Z\gamma}) + c_W^2 (2 \delta s_W + s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ}))) \right\} - \end{aligned} \right\} + \\ & c_W^2 \left\{ \begin{aligned} & U_{s2,1}^{\tilde{d},j1} (1 + 2 c_W^2) \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) - \\ & 2 s_W^2 U_{s2,2}^{\tilde{d},j1} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \\ & U_{s1,1}^{\tilde{d},j1*} \left\{ \begin{aligned} & 2 c_W^2 s_W (1 + 2 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) + \\ & U_{s2,1}^{\tilde{d},j1} \left(c_W (1 + 2 c_W^2)^2 \delta Z_{Z\gamma} + 4 \delta s_W s_W^2 (1 + 2 c_W^2) - 2 c_W^2 (\delta s_W (10 - 4 c_W^2) - s_W (1 + 2 c_W^2) (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{ZZ})) \right) \end{aligned} \right\} \end{aligned} \right\}$$

$$C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, Z, Z) = \frac{i e^2 \delta_{j1,j2}}{36 c_W^4 s_W^3} \left\{ \begin{aligned} & s_W \left\{ \begin{aligned} & 4 s_W^3 U_{s1,2}^{\tilde{d},j1*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,2}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,2}^{\tilde{d},j1} \right) - \right. \\ & \left. 2 U_{s2,2}^{\tilde{d},j1} (c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{ZZ}))) \right\} + \end{aligned} \right\} + \\ & c_W^2 \left\{ \begin{aligned} & (1 + 2 c_W^2)^2 U_{s2,1}^{\tilde{d},j1} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) + \\ & 4 s_W^4 U_{s2,2}^{\tilde{d},j1} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,2}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,2}^{\tilde{d},j1*} \right) \end{aligned} \right\} \\ & U_{s1,1}^{\tilde{d},j1*} (1 + 2 c_W^2) \left\{ c_W^2 s_W (1 + 2 c_W^2) \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) - \right. \\ & \left. 2 U_{s2,1}^{\tilde{d},j1} (4 \delta s_W s_W^4 - 2 s_W^2 (3 \delta s_W + c_W^3 \delta Z_{\gamma Z}) + c_W^2 (\delta s_W (10 - 4 c_W^2) - s_W (1 + 2 c_W^2) (2 \delta Z_e + \delta Z_{ZZ}))) \right\} \end{aligned} \right\}$$

$$C(\tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, \gamma, W^-) = \frac{i e^2}{6 \sqrt{2} c_W s_W^2} \left\{ \text{CKM}_{j1,j2}^* \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ c_W s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) - \right. \right. \right. \right. \\ \left. \left. \left. U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{Z\gamma} s_W^2 + c_W (2 \delta s_W - s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W)) \right) \right\} + \right\} + \right. \\ \left. \left. c_W s_W U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \right\} \right. \\ \left. \left. 2 c_W \delta \text{CKM}_{j1,j2}^* s_W U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \right\} \right.$$

$$C(\tilde{d}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}, \gamma, W^+) = \frac{i e^2}{6 \sqrt{2} c_W s_W^2} \left\{ \text{CKM}_{j1,j2} \left\{ U_{s2,1}^{\tilde{d},j2*} \left\{ c_W s_W \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) - \right. \right. \right. \right. \\ \left. \left. \left. U_{s1,1}^{\tilde{u},j1} \left(\delta Z_{Z\gamma} s_W^2 + c_W (2 \delta s_W - s_W (\delta \bar{Z}_W + 4 \delta Z_e + \delta Z_{\gamma\gamma})) \right) \right\} + \right\} + \right. \\ \left. \left. c_W s_W U_{s1,1}^{\tilde{u},j1} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) \right\} \right. \\ \left. \left. 2 c_W \delta \text{CKM}_{j1,j2} s_W U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \right\} \right.$$

$$C(\tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, Z, W^-) = -\frac{i e^2}{6 \sqrt{2} c_W^3 s_W} \left\{ \text{CKM}_{j1,j2}^* \left\{ U_{s1,1}^{\tilde{u},j1*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) - \right. \right. \right. \right. \\ \left. \left. \left. U_{s2,1}^{\tilde{d},j2} \left(c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 s_W (4 \delta Z_e + \delta Z_W + \delta Z_{ZZ}) \right) \right\} + \right\} + \right. \\ \left. \left. c_W^2 s_W U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) \right\} \right. \\ \left. \left. 2 c_W^2 \delta \text{CKM}_{j1,j2}^* s_W U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \right\} \right.$$

$$C(\tilde{d}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}, Z, W^+) = -\frac{i e^2}{6 \sqrt{2} c_W^3 s_W} \left\{ \text{CKM}_{j1,j2} \left\{ U_{s2,1}^{\tilde{d},j2*} \left\{ c_W^2 s_W \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) - \right. \right. \right. \right. \\ \left. \left. \left. U_{s1,1}^{\tilde{u},j1} \left(c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2 - c_W^2 s_W (\delta \bar{Z}_W + 4 \delta Z_e + \delta Z_{ZZ}) \right) \right\} + \right\} + \right. \\ \left. \left. c_W^2 s_W U_{s1,1}^{\tilde{u},j1} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) \right\} \right. \\ \left. \left. 2 c_W^2 \delta \text{CKM}_{j1,j2} s_W U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \right\} \right.$$

$$C(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, W^-, W^+) = \frac{i e^2 \delta_{j1,j2}}{4 s_W^3} \left\{ s_W U_{s2,1}^{\tilde{u},j1} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) - \right. \\ \left. U_{s1,1}^{\tilde{u},j1*} \left(U_{s2,1}^{\tilde{u},j1} (4 \delta s_W - s_W (\delta \bar{Z}_W + 4 \delta Z_e + \delta Z_W)) - s_W (\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1}) \right) \right\}$$

$$C(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, W^-, W^+) = \frac{i e^2 \delta_{j1,j2}}{4 s_W^3} \left\{ s_W U_{s2,1}^{\tilde{d},j1} \left(\delta Z_{1,s1}^{\tilde{d},j1} U_{1,1}^{\tilde{d},j1*} + \delta Z_{2,s1}^{\tilde{d},j1} U_{2,1}^{\tilde{d},j1*} \right) - \right. \\ \left. U_{s1,1}^{\tilde{d},j1*} \left(U_{s2,1}^{\tilde{d},j1} (4 \delta s_W - s_W (\delta \bar{Z}_W + 4 \delta Z_e + \delta Z_W)) - s_W (\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1}) \right) \right\}$$

[SSVV] 2 Squarks – 2 Gluons

$$C_{435}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, g, g) = \frac{i g_s^2 \delta_{j1,j2}}{2} \left((T^{g1} T^{g2})_{o2,o1} + (T^{g2} T^{g1})_{o2,o1} \right) \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{u},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{u},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{u},j1} + 2 \delta_{s1,s2} (\delta Z_{gg} + 2 \delta Z_{g_s}) \right)$$

$$C_{436}(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, g, g) = \frac{i g_s^2 \delta_{j1,j2}}{2} \left((T^{g1} T^{g2})_{o2,o1} + (T^{g2} T^{g1})_{o2,o1} \right) \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{d},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{d},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{d},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{d},j1} + 2 \delta_{s1,s2} (\delta Z_{gg} + 2 \delta Z_{g_s}) \right)$$

[SSVV] 2 Squarks – Gauge Boson – Gluon

$$C_{437}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, g, \gamma) = \frac{i e g_s \delta_{j1,j2} T_{o2,o1}^{g1}}{6 c_W s_W} \left\{ 4 c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{u},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{u},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{u},j1} + \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{gg} + 2 \delta Z_{g_s}) \right) - \delta Z_{Z\gamma} \left(4 \delta_{s1,s2} s_W^2 - 3 U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \right) \right\}$$

$$C_{438}(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, g, \gamma) = -\frac{i e g_s \delta_{j1,j2} T_{o2,o1}^{g1}}{6 c_W s_W} \left\{ 2 c_W s_W \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{d},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{d},j2} + \delta_{s2,1} \delta Z_{1,s1}^{\tilde{d},j1} + \delta_{s2,2} \delta Z_{2,s1}^{\tilde{d},j1} + \delta_{s1,s2} (2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{gg} + 2 \delta Z_{g_s}) \right) - \delta Z_{Z\gamma} \left(2 \delta_{s1,s2} s_W^2 - 3 U_{s1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \right) \right\}$$

$$C_{439}(\tilde{u}_{j1}^{s1}, \tilde{u}_{j2}^{s2,\dagger}, g, Z) = \frac{i e g_s \delta_{j1,j2} T_{o2,o1}^{g1}}{6 c_W^3 s_W^2} \left\{ \delta_{s1,s2} s_W^2 \left(4 c_W^3 \delta Z_{\gamma Z} - 8 \delta s_W s_W^2 - 4 c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{gg} + \delta Z_{ZZ} + 2 \delta Z_{g_s})) \right) - c_W^2 \left\{ 4 s_W^3 \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{u},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{u},j2} \right) + s_W \left(\delta Z_{1,s1}^{\tilde{u},j1} \left(4 \delta_{s2,1} s_W^2 - 3 U_{1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \right) + \delta Z_{2,s1}^{\tilde{u},j1} \left(4 \delta_{s2,2} s_W^2 - 3 U_{2,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{u},j1} \right) \right) \right\} + U_{s1,1}^{\tilde{u},j1*} \left\{ 6 \delta s_W s_W^2 U_{s2,1}^{\tilde{u},j1} - c_W^2 \left(U_{s2,1}^{\tilde{u},j1} (6 \delta s_W - 3 s_W (2 \delta Z_e + \delta Z_{gg} + \delta Z_{ZZ} + 2 \delta Z_{g_s})) - 3 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{u},j2} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s2}^{\tilde{u},j2} U_{2,1}^{\tilde{u},j1} \right) \right) \right\} \right\}$$

$$C_{440}(\tilde{d}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, g, Z) = -\frac{i e g_s \delta_{j1,j2} T_{o2,o1}^{g1}}{6 c_W^3 s_W^2} \left\{ \delta_{s1,s2} s_W^2 \left(2 c_W^3 \delta Z_{\gamma Z} - 4 \delta s_W s_W^2 - 2 c_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_{gg} + \delta Z_{ZZ} + 2 \delta Z_{g_s})) \right) - c_W^2 \left\{ 2 s_W^3 \left(\delta_{s1,1} \delta \bar{Z}_{1,s2}^{\tilde{d},j2} + \delta_{s1,2} \delta \bar{Z}_{2,s2}^{\tilde{d},j2} \right) + s_W \left(\delta Z_{1,s1}^{\tilde{d},j1} \left(2 \delta_{s2,1} s_W^2 - 3 U_{1,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \right) + \delta Z_{2,s1}^{\tilde{d},j1} \left(2 \delta_{s2,2} s_W^2 - 3 U_{2,1}^{\tilde{d},j1*} U_{s2,1}^{\tilde{d},j1} \right) \right) \right\} + U_{s1,1}^{\tilde{d},j1*} \left\{ 6 \delta s_W s_W^2 U_{s2,1}^{\tilde{d},j1} - c_W^2 \left(U_{s2,1}^{\tilde{d},j1} (6 \delta s_W - 3 s_W (2 \delta Z_e + \delta Z_{gg} + \delta Z_{ZZ} + 2 \delta Z_{g_s})) - 3 s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j1} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j1} \right) \right) \right\} \right\}$$

$$C_{441}(\tilde{u}_{j1}^{s1}, \tilde{d}_{j2}^{s2,\dagger}, g, W^-) = \frac{i e g_s T_{o2,o1}^{g1}}{\sqrt{2} s_W^2} \left\{ \text{CKM}_{j1,j2}^* \left\{ s_W U_{s2,1}^{\tilde{d},j2} \left(\delta Z_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1*} + \delta Z_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1*} \right) - \right. \right. \\ \left. U_{s1,1}^{\tilde{u},j1*} \left(U_{s2,1}^{\tilde{d},j2} (2 \delta s_W - s_W (2 \delta Z_e + \delta Z_{gg} + \delta Z_W + 2 \delta Z_{g_s})) \right) - s_W \left(\delta \bar{Z}_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2} + \delta \bar{Z}_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2} \right) \right\} + \left. \right. \\ \left. 2 \delta \text{CKM}_{j1,j2}^* s_W U_{s1,1}^{\tilde{u},j1*} U_{s2,1}^{\tilde{d},j2} \right\}$$

$$C_{442}(\tilde{d}_{j2}^{s2}, \tilde{u}_{j1}^{s1,\dagger}, g, W^+) = \frac{i e g_s T_{o1,o2}^{g1}}{\sqrt{2} s_W^2} \left\{ \text{CKM}_{j1,j2} \left\{ s_W U_{s1,1}^{\tilde{u},j1} \left(\delta Z_{1,s2}^{\tilde{d},j2} U_{1,1}^{\tilde{d},j2*} + \delta Z_{2,s2}^{\tilde{d},j2} U_{2,1}^{\tilde{d},j2*} \right) - \right. \right. \\ \left. U_{s2,1}^{\tilde{d},j2*} \left(U_{s1,1}^{\tilde{u},j1} (2 \delta s_W - s_W (\delta \bar{Z}_W + 2 \delta Z_e + \delta Z_{gg} + 2 \delta Z_{g_s})) \right) - s_W \left(\delta \bar{Z}_{1,s1}^{\tilde{u},j1} U_{1,1}^{\tilde{u},j1} + \delta \bar{Z}_{2,s1}^{\tilde{u},j1} U_{2,1}^{\tilde{u},j1} \right) \right\} + \left. \right. \\ \left. 2 \delta \text{CKM}_{j1,j2} s_W U_{s1,1}^{\tilde{u},j1} U_{s2,1}^{\tilde{d},j2*} \right\}$$

[SV] Higgs – Gauge Boson

$$C_{401}(A^0, Z) = \begin{bmatrix} -\delta Z_{AG} M_Z \\ 0 \end{bmatrix}$$

$$C_{402}(G^0, Z) = \begin{bmatrix} -\frac{M_Z}{2} \left(\frac{\delta M_Z^2}{M_Z^2} + \delta Z_{ZZ} + \delta Z_{GG} \right) \\ 0 \end{bmatrix}$$

$$C_{403}(G^0, \gamma) = \begin{bmatrix} -\frac{\delta Z_{Z\gamma} M_Z}{2} \\ 0 \end{bmatrix}$$

$$C_{404}(H^-, W^+) = \begin{bmatrix} i \delta Z_{G^- H^-} M_W \\ 0 \end{bmatrix}$$

$$C_{405}(H^+, W^-) = \begin{bmatrix} -i \delta Z_{H^- G^-} M_W \\ 0 \end{bmatrix}$$

$$C_{406}(G^-, W^+) = \begin{bmatrix} \frac{i M_W}{2} \left(\frac{\delta M_W^2}{M_W^2} + \delta Z_W + \delta Z_{G^- G^-} \right) \\ 0 \end{bmatrix}$$

$$C_{407}(G^+, W^-) = \begin{bmatrix} -\frac{i M_W}{2} \left(\frac{\delta M_W^2}{M_W^2} + \delta Z_W + \delta Z_{G^- G^-} \right) \\ 0 \end{bmatrix}$$

[SVV] Higgs – 2 Gauge Bosons

$$C_5(G^-, \gamma, W^+) = -\frac{i e}{2 c_W M_W} (\delta Z_{Z\gamma} M_W^2 s_W - c_W (\delta M_W^2 + M_W^2 (\delta \bar{Z}_W + 2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_{G^- G^-})))$$

$$C_6(G^+, \gamma, W^-) = -\frac{i e}{2 c_W M_W} (\delta Z_{Z\gamma} M_W^2 s_W - c_W (\delta M_W^2 + M_W^2 (2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W + \delta Z_{G^- G^-})))$$

$$C_7(G^-, Z, W^+) = \frac{i e}{2 c_W^3 M_W} (M_W^2 (c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2) - c_W^2 (\delta M_W^2 s_W + M_W^2 (2 \delta s_W + s_W (\delta \bar{Z}_W + 2 \delta Z_e + \delta Z_{ZZ} + \delta Z_{G^- G^-}))))$$

$$C_8(G^+, Z, W^-) = \frac{i e}{2 c_W^3 M_W} (M_W^2 (c_W^3 \delta Z_{\gamma Z} - 2 \delta s_W s_W^2) - c_W^2 (\delta M_W^2 s_W + M_W^2 (2 \delta s_W + s_W (2 \delta Z_e + \delta Z_W + \delta Z_{ZZ} + \delta Z_{G^- G^-}))))$$

$$C_{81}(h^0, Z, Z) = \frac{i e}{2 c_W^4 M_W s_W^2} \left\{ 4 \delta s_W M_W^2 s_{\beta-\alpha} s_W^2 - c_W^2 \left(2 \delta s_W M_W^2 s_{\beta-\alpha} - s_W \left(\delta M_W^2 s_{\beta-\alpha} + M_W^2 \left(c_{\beta-\alpha} \left(2 c_\beta^2 \delta t_\beta + \delta Z_{hH} \right) + s_{\beta-\alpha} (\delta Z_{hh} + 2 (\delta Z_e + \delta Z_{ZZ})) \right) \right) \right) \right\}$$

$$C_{82}(H^0, Z, Z) = -\frac{i e}{2 c_W^4 M_W s_W^2} \left\{ c_W^2 M_W^2 s_{\beta-\alpha} s_W (2 c_\beta^2 \delta t_\beta - \delta Z_{hH}) - c_{\beta-\alpha} (4 \delta s_W M_W^2 s_W^2 - c_W^2 (2 \delta s_W M_W^2 - s_W (\delta M_W^2 + M_W^2 (\delta Z_{HH} + 2 (\delta Z_e + \delta Z_{ZZ})))) \right\}$$

$$C_{83}(h^0, W^-, W^+) = -\frac{i e}{2 M_W s_W^2} (2 \delta s_W M_W^2 s_{\beta-\alpha} - s_W (\delta M_W^2 s_{\beta-\alpha} + M_W^2 (c_{\beta-\alpha} (2 c_\beta^2 \delta t_\beta + \delta Z_{hH}) + s_{\beta-\alpha} (\delta \bar{Z}_W + 2 \delta Z_e + \delta Z_W + \delta Z_{hh}))))$$

$$C_{84}(H^0, W^-, W^+) = -\frac{i e}{2 M_W s_W^2} (M_W^2 s_{\beta-\alpha} s_W (2 c_\beta^2 \delta t_\beta - \delta Z_{hH}) + c_{\beta-\alpha} (2 \delta s_W M_W^2 - s_W (\delta M_W^2 + M_W^2 (\delta \bar{Z}_W + 2 \delta Z_e + \delta Z_W + \delta Z_{HH}))))$$

$$C(h^0, Z, \gamma) = \frac{\mathrm{i} e \delta Z_{Z\gamma} M_W s_{\beta-\alpha}}{2 c_W^2 s_W} \quad 386$$

$$C(H^0, Z, \gamma) = \frac{\mathrm{i} e c_{\beta-\alpha} \delta Z_{Z\gamma} M_W}{2 c_W^2 s_W} \quad 387$$

$$C(H^-, \gamma, W^+) = \frac{\mathrm{i} e M_W}{2} (2 c_\beta \delta s_\beta + \delta Z_{G^- H^-} - 2 \delta c_\beta s_\beta) \quad 388$$

$$C(H^+, \gamma, W^-) = \frac{\mathrm{i} e M_W}{2} (2 c_\beta \delta s_\beta + \delta Z_{G^- H^-}^* - 2 \delta c_\beta s_\beta) \quad 389$$

$$C(H^-, Z, W^+) = -\frac{\mathrm{i} e M_W s_W}{2 c_W} (2 c_\beta \delta s_\beta + \delta Z_{G^- H^-} - 2 \delta c_\beta s_\beta) \quad 390$$

$$C(H^+, Z, W^-) = -\frac{\mathrm{i} e M_W s_W}{2 c_W} (2 c_\beta \delta s_\beta + \delta Z_{G^- H^-}^* - 2 \delta c_\beta s_\beta) \quad 391$$

[UU] 2 Ghosts

$$C(u_\gamma, \bar{u}_\gamma) = \begin{bmatrix} \mathrm{i} \left(\frac{\delta Z_{\gamma\gamma}}{2} - \delta U_{\gamma\gamma} \right) \\ 0 \end{bmatrix} \quad 412$$

$$C(u_Z, \bar{u}_Z) = \begin{bmatrix} \mathrm{i} \left(\frac{\delta Z_{ZZ}}{2} - \delta U_{ZZ} \right) \\ -\frac{\mathrm{i} \xi_Z}{2} (\delta M_Z^2 + M_Z^2 (2 \delta U_{ZZ} - \delta Z_{G^0})) \end{bmatrix} \quad 413$$

$$C(u_Z, \bar{u}_\gamma) = \begin{bmatrix} \mathrm{i} \left(\frac{\delta Z_{\gamma Z}}{2} - \delta U_{\gamma Z} \right) \\ 0 \end{bmatrix} \quad 414$$

$$C(u_\gamma, \bar{u}_Z) = \begin{bmatrix} \mathrm{i} \left(\frac{\delta Z_{Z\gamma}}{2} - \delta U_{Z\gamma} \right) \\ -\mathrm{i} \delta U_{Z\gamma} M_Z^2 \xi_Z \end{bmatrix} \quad 415$$

$$C_{416}(u_-, \bar{u}_-) = \begin{bmatrix} i \left(\frac{\delta Z_W}{2} - \delta U_W \right) \\ -\frac{i \xi_W}{2} (\delta M_W^2 + M_W^2 (2 \delta U_W - \delta Z_G)) \end{bmatrix}$$

$$C_{417}(u_+, \bar{u}_+) = \begin{bmatrix} i \left(\frac{\delta Z_W}{2} - \delta U_W \right) \\ -\frac{i \xi_W}{2} (\delta M_W^2 + M_W^2 (2 \delta U_W - \delta Z_G)) \end{bmatrix}$$

[UVV] 2 Ghosts – Gauge Boson

$$C_{19}(\bar{u}_-, u_-, \gamma) = \begin{bmatrix} -\frac{i e}{2} \left(\frac{c_W \delta Z_{Z\gamma}}{s_W} + 2 \delta U_W + 2 \delta Z_e + \delta Z_{\gamma\gamma} - \delta Z_W \right) \\ 0 \end{bmatrix}$$

$$C_{20}(\bar{u}_+, u_+, \gamma) = \begin{bmatrix} \frac{i e}{2} \left(\frac{c_W \delta Z_{Z\gamma}}{s_W} + 2 \delta U_W + 2 \delta Z_e + \delta Z_{\gamma\gamma} - \delta Z_W \right) \\ 0 \end{bmatrix}$$

$$C_{21}(\bar{u}_-, u_-, Z) = \begin{bmatrix} \frac{i e}{2 c_W s_W^2} (2 \delta s_W - c_W s_W (\delta Z_{\gamma Z} s_W - c_W (\delta Z_W - \delta Z_{ZZ} - 2 (\delta U_W + \delta Z_e)))) \\ 0 \end{bmatrix}$$

$$C_{22}(\bar{u}_+, u_+, Z) = \begin{bmatrix} -\frac{i e}{2 c_W s_W^2} (2 \delta s_W - c_W s_W (\delta Z_{\gamma Z} s_W - c_W (\delta Z_W - \delta Z_{ZZ} - 2 (\delta U_W + \delta Z_e)))) \\ 0 \end{bmatrix}$$

$$C_{23}(\bar{u}_-, u_\gamma, W^-) = \begin{bmatrix} i e \left(\frac{c_W \delta U_{Z\gamma}}{s_W} + \delta U_{\gamma\gamma} + \delta Z_e \right) \\ 0 \end{bmatrix}$$

$$C_{24}(\bar{u}_+, u_\gamma, W^+) = \begin{bmatrix} -ie \left(\frac{c_W \delta U_{Z\gamma}}{s_W} + \delta U_{\gamma\gamma} + \delta Z_e \right) \\ 0 \end{bmatrix}$$

$$C_{25}(\bar{u}_\gamma, u_+, W^-) = \begin{bmatrix} \frac{ie}{2} \left(\frac{c_W \delta Z_{\gamma Z}}{s_W} - 2\delta U_W - 2\delta Z_e + \delta Z_{\gamma\gamma} - \delta Z_W \right) \\ 0 \end{bmatrix}$$

$$C_{26}(\bar{u}_\gamma, u_-, W^+) = \begin{bmatrix} ie \left(\delta U_W - \frac{1}{2} \left(\frac{c_W \delta Z_{\gamma Z}}{s_W} - 2\delta Z_e + \delta Z_{\gamma\gamma} - \delta Z_W \right) \right) \\ 0 \end{bmatrix}$$

$$C_{27}(\bar{u}_-, u_Z, W^-) = \begin{bmatrix} -\frac{ie}{c_W s_W^2} (\delta s_W - c_W s_W (\delta U_{\gamma Z} s_W + c_W (\delta U_{ZZ} + \delta Z_e))) \\ 0 \end{bmatrix}$$

$$C_{28}(\bar{u}_+, u_Z, W^+) = \begin{bmatrix} \frac{ie}{c_W s_W^2} (\delta s_W - c_W s_W (\delta U_{\gamma Z} s_W + c_W (\delta U_{ZZ} + \delta Z_e))) \\ 0 \end{bmatrix}$$

$$C_{29}(\bar{u}_Z, u_+, W^-) = \begin{bmatrix} \frac{ie}{2 c_W s_W^2} (2\delta s_W + c_W s_W (\delta Z_{Z\gamma} s_W - c_W (\delta Z_W - \delta Z_{ZZ} + 2(\delta U_W + \delta Z_e)))) \\ 0 \end{bmatrix}$$

$$C_{30}(\bar{u}_Z, u_-, W^+) = \begin{bmatrix} -\frac{ie}{2 c_W s_W^2} (2\delta s_W + c_W s_W (\delta Z_{Z\gamma} s_W - c_W (\delta Z_W - \delta Z_{ZZ} + 2(\delta U_W + \delta Z_e)))) \\ 0 \end{bmatrix}$$

[VV] 2 Gauge Bosons

$$C(W^+, W^-) = \begin{bmatrix} \mathbf{i} \delta Z_W \\ \mathbf{i} (\delta M_W^2 + \delta Z_W M_W^2) \\ -\mathbf{i} \delta Z_W \end{bmatrix}$$

$$C(Z, Z) = \begin{bmatrix} \mathbf{i} \delta Z_{ZZ} \\ \mathbf{i} (\delta M_Z^2 + \delta Z_{ZZ} M_Z^2) \\ -\mathbf{i} \delta Z_{ZZ} \end{bmatrix}$$

$$C(\gamma, \gamma) = \begin{bmatrix} \mathbf{i} \delta Z_{\gamma\gamma} \\ 0 \\ -\mathbf{i} \delta Z_{\gamma\gamma} \end{bmatrix}$$

$$C(\gamma, Z) = \begin{bmatrix} \frac{\mathbf{i}}{2} (\delta Z_{\gamma Z} + \delta Z_{Z\gamma}) \\ \frac{\mathbf{i} \delta Z_{Z\gamma} M_Z^2}{2} \\ -\frac{\mathbf{i}}{2} (\delta Z_{\gamma Z} + \delta Z_{Z\gamma}) \end{bmatrix}$$

[VV] 2 Gluons

$$C(g, g) = \begin{bmatrix} \mathbf{i} \delta_{\mathbf{g}1, \mathbf{g}2} \delta Z_{gg} \\ 0 \\ -\mathbf{i} \delta_{\mathbf{g}1, \mathbf{g}2} \delta Z_{gg} \end{bmatrix}$$

[VVV] 3 Gauge Bosons

$$C(\gamma, W^+, W^-) = -\frac{ie}{2} \left(\frac{c_W \delta Z_{Z\gamma}}{s_W} + \delta Z_{\gamma\gamma} + 2 (\delta Z_e + \delta Z_W) \right)$$

$$C(Z, W^+, W^-) = \frac{ie}{2 c_W s_W^2} (2 \delta s_W - c_W s_W (\delta Z_{\gamma Z} s_W + c_W (\delta Z_{ZZ} + 2 (\delta Z_e + \delta Z_W))))$$

[VVV] 3 Gluons

$$C(g, g, g) = \frac{g_s f^{g^1, g^2, g^3}}{2} (3 \delta Z_{gg} + 2 \delta Z_{g_s})$$

[VVVV] 4 Gauge Bosons

$$C(\gamma, \gamma, W^-, W^+) = \begin{bmatrix} -\frac{2ie^2}{s_W} (c_W \delta Z_{Z\gamma} + s_W (2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W)) \\ \frac{ie^2}{s_W} (c_W \delta Z_{Z\gamma} + s_W (2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W)) \\ \frac{ie^2}{s_W} (c_W \delta Z_{Z\gamma} + s_W (2 \delta Z_e + \delta Z_{\gamma\gamma} + \delta Z_W)) \end{bmatrix}$$

$$C(\gamma, Z, W^-, W^+) = \begin{bmatrix} \frac{ie^2}{c_W s_W^2} (2 \delta s_W - c_W (c_W^2 \delta Z_{Z\gamma} + \delta Z_{\gamma Z} s_W^2 + c_W s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + 2 \delta Z_W + \delta Z_{ZZ}))) \\ -\frac{ie^2}{2 c_W s_W^2} (2 \delta s_W - c_W (c_W^2 \delta Z_{Z\gamma} + \delta Z_{\gamma Z} s_W^2 + c_W s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + 2 \delta Z_W + \delta Z_{ZZ}))) \\ -\frac{ie^2}{2 c_W s_W^2} (2 \delta s_W - c_W (c_W^2 \delta Z_{Z\gamma} + \delta Z_{\gamma Z} s_W^2 + c_W s_W (4 \delta Z_e + \delta Z_{\gamma\gamma} + 2 \delta Z_W + \delta Z_{ZZ}))) \end{bmatrix}$$

$$C_{41}(Z, Z, W^-, W^+) = \begin{bmatrix} \frac{2ie^2}{s_W^3} (2\delta s_W - c_W s_W (\delta Z_{\gamma Z} s_W + c_W (2\delta Z_e + \delta Z_W + \delta Z_{ZZ}))) \\ -\frac{ie^2}{s_W^3} (2\delta s_W - c_W s_W (\delta Z_{\gamma Z} s_W + c_W (2\delta Z_e + \delta Z_W + \delta Z_{ZZ}))) \\ -\frac{ie^2}{s_W^3} (2\delta s_W - c_W s_W (\delta Z_{\gamma Z} s_W + c_W (2\delta Z_e + \delta Z_W + \delta Z_{ZZ}))) \end{bmatrix}$$

$$C_{42}(W^-, W^-, W^+, W^+) = \begin{bmatrix} -\frac{4ie^2}{s_W^3} (\delta s_W - s_W (\delta Z_e + \delta Z_W)) \\ \frac{2ie^2}{s_W^3} (\delta s_W - s_W (\delta Z_e + \delta Z_W)) \\ \frac{2ie^2}{s_W^3} (\delta s_W - s_W (\delta Z_e + \delta Z_W)) \end{bmatrix}$$

[VVVV] 4 Gluons

$$C_{423}(g, g, g, g) = \begin{bmatrix} -2ig_s^2 (\delta Z_{gg} + \delta Z_{g_s}) (fg^{1,g^3,x} f^{x,g^2,g^4} - fg^{1,g^4,x} f^{x,g^3,g^2}) \\ -2ig_s^2 (\delta Z_{gg} + \delta Z_{g_s}) (fg^{1,g^2,x} f^{x,g^3,g^4} + fg^{1,g^4,x} f^{x,g^3,g^2}) \\ 2ig_s^2 (\delta Z_{gg} + \delta Z_{g_s}) (fg^{1,g^2,x} f^{x,g^3,g^4} + fg^{1,g^3,x} f^{x,g^2,g^4}) \end{bmatrix}$$