

## SMNLG

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[FFS] **2 Leptons – Higgs**

$$C_{82}(\bar{e}_{g1}, e_{g2}, H) = -\frac{ie\delta_{g1,g2}m_{e_{g1}}}{2M_W s_W} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$C_{85}(\bar{e}_{g1}, e_{g2}, G^0) = \frac{e\delta_{g1,g2}m_{e_{g1}}}{2M_W s_W} \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

$$C_{90}(\bar{\nu}_{g1}, e_{g2}, G^+) = -\frac{ie\delta_{g1,g2}m_{e_{g1}}}{\sqrt{2}M_W s_W} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$C_{91}(\bar{e}_{g1}, \nu_{g2}, G^-) = -\frac{ie\delta_{g1,g2}m_{e_{g1}}}{\sqrt{2}M_W s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

[FFS] **2 Quarks – Higgs**

$$C_{83}(\bar{u}_{g1}, u_{g2}, H) = -\frac{ie\delta_{g1,g2}m_{u_{g1}}}{2M_W s_W} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$C_{84}(\bar{d}_{g1}, d_{g2}, H) = -\frac{ie\delta_{g1,g2}m_{d_{g1}}}{2M_W s_W} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$C_{86}(\bar{u}_{g1}, u_{g2}, G^0) = \frac{e\delta_{g1,g2}m_{u_{g1}}}{2M_W s_W} \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$C_{87}(\bar{d}_{g1}, d_{g2}, G^0) = \frac{e\delta_{g1,g2}m_{d_{g1}}}{2M_W s_W} \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

$$C_{88}(\bar{u}_{g1}, d_{g2}, G^+) = \frac{ie\text{CKM}_{g1,g2}}{\sqrt{2}M_W s_W} \begin{bmatrix} m_{u_{g1}} \\ -m_{d_{g2}} \end{bmatrix}$$

$$C_{89}(\bar{d}_{g1}, u_{g2}, G^-) = \frac{ie\text{CKM}_{g2,g1}^*}{\sqrt{2}M_W s_W} \begin{bmatrix} -m_{d_{g1}} \\ m_{u_{g2}} \end{bmatrix}$$

**[FFV] 2 Leptons – Gauge Boson**

$$C_{71}(\bar{e}_{g1}, e_{g2}, \gamma) = ie\delta_{g1,g2} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$C_{74}(\bar{\nu}_{g1}, \nu_{g2}, Z) = \frac{ie\delta_{g1,g2}}{2c_W s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{75}(\bar{e}_{g1}, e_{g2}, Z) = \frac{ie\delta_{g1,g2}}{c_W} \begin{bmatrix} -\frac{1}{s_W} \left( \frac{1}{2} - s_W^2 \right) \\ s_W \end{bmatrix}$$

$$C_{78}(\bar{\nu}_{g1}, e_{g2}, W^+) = \frac{ie\delta_{g1,g2}}{\sqrt{2}s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{79}(\bar{e}_{g1}, \nu_{g2}, W^-) = \frac{ie\delta_{g1,g2}}{\sqrt{2}s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

[FFV] **2 Quarks – Gauge Boson**

$$C_{72}(\bar{u}_{g1}, u_{g2}, \gamma) = -\frac{2}{3}ie\delta_{g1,g2} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$C_{73}(\bar{d}_{g1}, d_{g2}, \gamma) = \frac{1}{3}ie\delta_{g1,g2} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$C_{76}(\bar{u}_{g1}, u_{g2}, Z) = \frac{ie\delta_{g1,g2}}{c_W} \begin{bmatrix} \frac{1}{s_W} \left( \frac{1}{2} - \frac{2}{3}s_W^2 \right) \\ -\frac{2s_W}{3} \end{bmatrix}$$

$$C_{77}(\bar{d}_{g1}, d_{g2}, Z) = \frac{ie\delta_{g1,g2}}{c_W} \begin{bmatrix} -\frac{1}{s_W} \left( \frac{1}{2} - \frac{1}{3}s_W^2 \right) \\ \frac{s_W}{3} \end{bmatrix}$$

$$C_{80}(\bar{u}_{g1}, d_{g2}, W^+) = \frac{ie\text{CKM}_{g1,g2}}{\sqrt{2}s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{81}(\bar{d}_{g1}, u_{g2}, W^-) = \frac{ie\text{CKM}_{g2,g1}^*}{\sqrt{2}s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

[SSS] **3 Higgs**

$$C_{34}(H, H, H) = \begin{bmatrix} -\frac{3ieM_H^2}{2M_W s_W} \end{bmatrix}$$

$$C_{35}(H, G^0, G^0) = \begin{bmatrix} -\frac{e}{M_W s_W} \left( \frac{1}{2}iM_H^2 + i\xi_Z\xi_\epsilon M_Z^2 \right) \end{bmatrix}$$

$$C_{36}(G^-, H, G^+) = \left[ -\frac{e}{s_W} \left( \frac{iM_H^2}{2M_W} + i\xi_W \xi_\delta M_W \right) \right]$$

[SSV] **2 Higgs – Gauge Boson**

$$C_{56}(G^0, H, Z) = \frac{e}{c_W s_W} \left[ \frac{\frac{1}{2} - \frac{\xi_\epsilon}{2}}{-\frac{1}{2}(1 + \xi_\epsilon)} \right]$$

$$C_{57}(G^+, G^-, \gamma) = ie \left[ \frac{-1}{1} \right]$$

$$C_{58}(G^+, G^-, Z) = -\frac{ie}{2c_W s_W} (c_W^2 - s_W^2) \left[ \frac{-1}{1} \right]$$

$$C_{59}(G^-, H, W^+) = \frac{e}{s_W} \left[ \frac{-\frac{i}{2} + \frac{1}{2}i\xi_\delta}{\frac{i}{2}(1 + \xi_\delta)} \right]$$

$$C_{60}(G^+, H, W^-) = \frac{e}{s_W} \left[ \frac{\frac{i}{2} - \frac{1}{2}i\xi_\delta}{-\frac{i}{2}(1 + \xi_\delta)} \right]$$

$$C_{61}(G^-, G^0, W^+) = \frac{e}{s_W} \left[ \frac{\frac{1}{2} - \frac{\xi_\kappa}{2}}{-\frac{1}{2}(1 + \xi_\kappa)} \right]$$

$$C_{62}(G^+, G^0, W^-) = \frac{e}{s_W} \left[ \frac{\frac{1}{2} - \frac{\xi_\kappa}{2}}{-\frac{1}{2}(1 + \xi_\kappa)} \right]$$

[SUU] **Higgs – 2 Ghosts**

$$_{105} C(H, \bar{u}_Z, u_Z) = \left[ -\frac{ie\xi_Z M_Z}{2c_W s_W} (1 + \xi_\epsilon) \right]$$

$$_{106} C(H, \bar{u}_-, u_-) = \left[ -\frac{ie\xi_W M_W}{2s_W} (1 + \xi_\delta) \right]$$

$$_{107} C(H, \bar{u}_+, u_+) = \left[ -\frac{ie\xi_W M_W}{2s_W} (1 + \xi_\delta) \right]$$

$$_{108} C(G^0, \bar{u}_+, u_+) = \left[ \left( \frac{1}{2} - \frac{\xi_\kappa}{2} \right) \frac{e\xi_W M_W}{s_W} \right]$$

$$_{109} C(G^0, \bar{u}_-, u_-) = \left[ -\left( \frac{1}{2} - \frac{\xi_\kappa}{2} \right) \frac{e\xi_W M_W}{s_W} \right]$$

$$_{110} C(G^+, \bar{u}_Z, u_-) = \left[ \frac{ie\xi_Z M_Z}{2s_W} \right]$$

$$_{111} C(G^-, \bar{u}_Z, u_+) = \left[ \frac{ie\xi_Z M_Z}{2s_W} \right]$$

$$_{112} C(G^+, \bar{u}_+, u_Z) = \left[ -\frac{e\xi_W M_W}{c_W s_W} \left( \frac{1}{2} i\xi_\kappa + \frac{i}{2} (c_W^2 - s_W^2) \right) \right]$$

$$_{113} C(G^-, \bar{u}_-, u_Z) = \left[ -\frac{e\xi_W M_W}{c_W s_W} \left( \frac{1}{2} i\xi_\kappa + \frac{i}{2} (c_W^2 - s_W^2) \right) \right]$$

$$_{114} C(G^+, \bar{u}_+, u_\gamma) = \left[ ie\xi_W M_W \right]$$

$$_{115} C(G^-, \bar{u}_-, u_\gamma) = \left[ ie\xi_W M_W \right]$$

[SVV] **Higgs – 2 Gauge Bosons**

$$_{63} C(H, W^+, W^-) = \left[ \frac{ieM_W}{s_W} \right]$$

$$_{64} C(H, Z, Z) = \left[ \frac{ieM_W}{s_W c_W^2} \right]$$

$$C_{66}(G^+, W^-, Z) = \left[ -ie \left( \frac{\xi_\beta c_W}{s_W} + \frac{s_W}{c_W} \right) M_W \right]$$

$$C_{67}(G^-, W^+, Z) = \left[ -ie \left( \frac{\xi_\beta c_W}{s_W} + \frac{s_W}{c_W} \right) M_W \right]$$

$$C_{68}(G^+, W^-, \gamma) = \left[ -e (i - i\xi_\alpha) M_W \right]$$

$$C_{69}(G^-, W^+, \gamma) = \left[ -e (i - i\xi_\alpha) M_W \right]$$

**[UVV] 2 Ghosts – Gauge Boson**

$$C_{92}(\bar{u}_-, u_-, \gamma) = ie \left[ \frac{-1}{\xi_\alpha} \right]$$

$$C_{93}(\bar{u}_+, u_+, \gamma) = ie \left[ \frac{1}{-\xi_\alpha} \right]$$

$$C_{94}(\bar{u}_-, u_-, Z) = \frac{iec_W}{s_W} \left[ \frac{1}{-\xi_\beta} \right]$$

$$C_{95}(\bar{u}_+, u_+, Z) = \frac{iec_W}{s_W} \left[ \frac{-1}{\xi_\beta} \right]$$

$$C_{96}(\bar{u}_-, u_Z, W^-) = -\frac{iec_W}{s_W} \left[ \frac{1}{\xi_\beta} \right]$$

$$C_{97}(\bar{u}_Z, u_-, W^+) = -\frac{iec_W}{s_W} \left[ \frac{1}{0} \right]$$

$$_{98} C\left(\bar{u}_+, u_Z, W^+\right)=\frac{\mathrm{i} e c_W}{s_W}\left[\begin{array}{c} 1 \\ \xi_\beta \end{array}\right]$$

$$_{99} C\left(\bar{u}_Z, u_+, W^-\right)=\frac{\mathrm{i} e c_W}{s_W}\left[\begin{array}{c} 1 \\ 0 \end{array}\right]$$

$$_{100} C\left(\bar{u}_-, u_\gamma, W^-\right)=\mathrm{i} e\left[\begin{array}{c} 1 \\ \xi_\alpha \end{array}\right]$$

$$_{101} C\left(\bar{u}_\gamma, u_-, W^+\right)=\mathrm{i} e\left[\begin{array}{c} 1 \\ 0 \end{array}\right]$$

$$_{102} C\left(\bar{u}_+, u_\gamma, W^+\right)=-\mathrm{i} e\left[\begin{array}{c} 1 \\ \xi_\alpha \end{array}\right]$$

$$_{103} C\left(\bar{u}_\gamma, u_+, W^-\right)=-\mathrm{i} e\left[\begin{array}{c} 1 \\ 0 \end{array}\right]$$

[VVV] **3 Gauge Bosons**

$$_{26} C\left(\gamma, W^+, W^-\right)=\mathrm{i} e\left[\begin{array}{c} -1 \\ -\frac{\xi_\alpha}{\xi_W} \\ \frac{\xi_\alpha}{\xi_W} \\ 0 \end{array}\right]$$



$$C_{27}(Z, W^+, W^-) = \frac{ie c_W}{s_W} \begin{bmatrix} 1 \\ \frac{\xi_\beta}{\xi_W} \\ -\frac{\xi_\beta}{\xi_W} \\ 0 \end{bmatrix}$$

[SSSS] **4 Higgs**

$$C_{28}(H, H, H, H) = \left[ -\frac{3ie^2 M_H^2}{4M_W^2 s_W^2} \right]$$

$$C_{29}(H, H, G^0, G^0) = \left[ -\left( \frac{1}{4} i M_H^2 + \frac{1}{2} i \xi_Z \xi_\epsilon^2 M_Z^2 \right) \frac{e^2}{M_W^2 s_W^2} \right]$$

$$C_{30}(H, H, G^-, G^+) = \left[ -\left( \frac{1}{2} i \xi_W \xi_\delta^2 + \frac{i M_H^2}{4 M_W^2} \right) \frac{e^2}{s_W^2} \right]$$

$$C_{31}(G^0, G^0, G^0, G^0) = \left[ -\frac{3ie^2 M_H^2}{4M_W^2 s_W^2} \right]$$

$$C_{32}(G^0, G^0, G^-, G^+) = \left[ -\left( \frac{1}{2} i \xi_W \xi_\kappa^2 + \frac{i M_H^2}{4 M_W^2} \right) \frac{e^2}{s_W^2} \right]$$

$$C_{33}(G^-, G^-, G^+, G^+) = \left[ -\frac{ie^2 M_H^2}{2M_W^2 s_W^2} \right]$$

[SSUU] **2 Higgs – 2 Ghosts**

$$C_{134}(H, H, \bar{u}_Z, u_Z) = \left[ -\frac{ie^2 \xi_Z \xi_\epsilon}{2c_W^2 s_W^2} \right]$$

$$C_{135}(G^0, G^0, \bar{u}_Z, u_Z) = \left[ \frac{ie^2 \xi_Z \xi_\epsilon}{2c_W^2 s_W^2} \right]$$

$$_{136} C(G^-, H, \bar{u}_Z, u_+) = \left[ \frac{ie^2 \xi_Z \xi_\epsilon}{4c_W s_W^2} \right]$$

$$_{137} C(G^+, H, \bar{u}_Z, u_-) = \left[ \frac{ie^2 \xi_Z \xi_\epsilon}{4c_W s_W^2} \right]$$

$$_{138} C(G^-, G^0, \bar{u}_Z, u_+) = \left[ \frac{e^2 \xi_Z \xi_\epsilon}{4c_W s_W^2} \right]$$

$$_{139} C(G^+, G^0, \bar{u}_Z, u_-) = \left[ -\frac{e^2 \xi_Z \xi_\epsilon}{4c_W s_W^2} \right]$$

$$_{140} C(G^+, H, \bar{u}_+, u_\gamma) = \left[ \frac{ie^2 \xi_W \xi_\delta}{2s_W} \right]$$

$$_{141} C(G^-, H, \bar{u}_-, u_\gamma) = \left[ \frac{ie^2 \xi_W \xi_\delta}{2s_W} \right]$$

$$_{142} C(G^+, G^0, \bar{u}_+, u_\gamma) = \left[ \frac{e^2 \xi_W \xi_\kappa}{2s_W} \right]$$

$$_{143} C(G^-, G^0, \bar{u}_-, u_\gamma) = \left[ -\frac{e^2 \xi_W \xi_\kappa}{2s_W} \right]$$

$$_{144} C(G^+, H, \bar{u}_+, u_Z) = \left[ -\frac{ie^2 \xi_W}{4c_W s_W^2} (\xi_\kappa + \xi_\delta (c_W^2 - s_W^2)) \right]$$

$$_{145} C(G^-, H, \bar{u}_-, u_Z) = \left[ -\frac{ie^2 \xi_W}{4c_W s_W^2} (\xi_\kappa + \xi_\delta (c_W^2 - s_W^2)) \right]$$

$$_{146} C(G^+, G^0, \bar{u}_+, u_Z) = \left[ -\frac{e^2 \xi_W}{4c_W s_W^2} (\xi_\delta + \xi_\kappa (c_W^2 - s_W^2)) \right]$$

$$_{147} C(G^-, G^0, \bar{u}_-, u_Z) = \left[ \frac{e^2 \xi_W}{4c_W s_W^2} (\xi_\delta + \xi_\kappa (c_W^2 - s_W^2)) \right]$$

$$_{148} C(H, H, \bar{u}_-, u_-) = \left[ -\frac{ie^2 \xi_W \xi_\delta}{2s_W^2} \right]$$

$$_{149} C(H, H, \bar{u}_+, u_+) = \left[ -\frac{ie^2 \xi_W \xi_\delta}{2s_W^2} \right]$$

$$_{150} C \left( G^0, G^0, \bar{u}_-, u_- \right) = \left[ -\frac{\mathrm{i}e^2 \xi_W \xi_\kappa}{2s_W^2} \right]$$

$$_{151} C \left( G^0, G^0, \bar{u}_+, u_+ \right) = \left[ -\frac{\mathrm{i}e^2 \xi_W \xi_\kappa}{2s_W^2} \right]$$

$$_{152} C \left( G^0, H, \bar{u}_-, u_- \right) = \left[ -\frac{e^2 \xi_W}{4s_W^2} (\xi_\delta - \xi_\kappa) \right]$$

$$_{153} C \left( G^0, H, \bar{u}_+, u_+ \right) = \left[ \frac{e^2 \xi_W}{4s_W^2} (\xi_\delta - \xi_\kappa) \right]$$

$$_{154} C \left( G^-, G^+, \bar{u}_-, u_- \right) = \left[ \frac{\mathrm{i}e^2 \xi_W}{4s_W^2} (\xi_\delta + \xi_\kappa) \right]$$

$$_{155} C \left( G^-, G^+, \bar{u}_+, u_+ \right) = \left[ \frac{\mathrm{i}e^2 \xi_W}{4s_W^2} (\xi_\delta + \xi_\kappa) \right]$$

$$_{156} C \left( G^-, G^-, \bar{u}_-, u_+ \right) = \left[ -\frac{\mathrm{i}e^2 \xi_W}{2s_W^2} (\xi_\delta - \xi_\kappa) \right]$$

$$_{157} C \left( G^+, G^+, \bar{u}_+, u_- \right) = \left[ -\frac{\mathrm{i}e^2 \xi_W}{2s_W^2} (\xi_\delta - \xi_\kappa) \right]$$

**[SSVV] 2 Higgs – 2 Gauge Bosons**

$$_{37} C \left( H, H, W^-, W^+ \right) = \left[ \frac{\mathrm{i}e^2}{2s_W^2} \right]$$

$$_{38} C \left( G^0, G^0, W^-, W^+ \right) = \left[ \frac{\mathrm{i}e^2}{2s_W^2} \right]$$

$$_{39} C \left( G^-, G^+, W^-, W^+ \right) = \left[ \frac{\mathrm{i}e^2}{2s_W^2} \right]$$

$$_{40} C \left( G^-, G^+, Z, Z \right) = \left[ \frac{\mathrm{i}e^2}{2c_W^2 s_W^2} \left( c_W^2 - s_W^2 \right)^2 \right]$$

$$_{41} C \left( G^-, G^+, \gamma, Z \right) = \left[ -\frac{\mathrm{i}e^2}{c_W s_W} \left( c_W^2 - s_W^2 \right) \right]$$

$$_{42} C(G^-, G^+, \gamma, \gamma) = \left[ 2ie^2 \right]$$

$$_{43} C(H, H, Z, Z) = \left[ \frac{ie^2}{2c_W^2 s_W^2} \right]$$

$$_{44} C(G^0, G^0, Z, Z) = \left[ \frac{ie^2}{2c_W^2 s_W^2} \right]$$

$$_{47} C(H, G^+, W^-, Z) = \left[ -\left(\frac{1}{2}ie^2\right) \left(\frac{\xi_\beta \xi_\delta c_W}{s_W^2} + \frac{1}{c_W}\right) \right]$$

$$_{48} C(H, G^-, W^+, Z) = \left[ -\left(\frac{1}{2}ie^2\right) \left(\frac{\xi_\beta \xi_\delta c_W}{s_W^2} + \frac{1}{c_W}\right) \right]$$

$$_{49} C(H, G^-, W^+, \gamma) = \left[ -\left(\frac{i}{2} - \frac{1}{2}i\xi_\alpha \xi_\delta\right) \frac{e^2}{s_W} \right]$$

$$_{50} C(H, G^+, W^-, \gamma) = \left[ -\left(\frac{i}{2} - \frac{1}{2}i\xi_\alpha \xi_\delta\right) \frac{e^2}{s_W} \right]$$

$$_{51} C(G^-, G^0, Z, W^+) = \left[ \frac{e^2}{2} \left(\frac{\xi_\beta \xi_\kappa c_W}{s_W^2} + \frac{1}{c_W}\right) \right]$$

$$_{52} C(G^+, G^0, Z, W^-) = \left[ -\frac{1}{2} \left(\frac{e^2}{c_W} + \frac{e^2 \xi_\beta \xi_\kappa c_W}{s_W^2}\right) \right]$$

$$_{53} C(G^-, G^0, \gamma, W^+) = \left[ \left(\frac{1}{2} - \frac{1}{2}\xi_\alpha \xi_\kappa\right) \frac{e^2}{s_W} \right]$$

$$_{54} C(G^+, G^0, \gamma, W^-) = \left[ -\left(\frac{1}{2} - \frac{1}{2}\xi_\alpha \xi_\kappa\right) \frac{e^2}{s_W} \right]$$

[UUVV] **2 Ghosts – 2 Gauge Bosons**

$$_{116} C(\bar{u}_+, u_\gamma, \gamma, W^+) = \left[ -ie^2 \xi_\alpha \right]$$

$$_{117} C(\bar{u}_-, u_\gamma, \gamma, W^-) = \left[ -ie^2 \xi_\alpha \right]$$

$$C_{118}(\bar{u}_+, u_\gamma, Z, W^+) = \left[ \frac{ie^2 \xi_\beta c_W}{s_W} \right]$$

$$C_{119}(\bar{u}_-, u_\gamma, Z, W^-) = \left[ \frac{ie^2 \xi_\beta c_W}{s_W} \right]$$

$$C_{120}(\bar{u}_+, u_Z, \gamma, W^+) = \left[ \frac{ie^2 \xi_\alpha c_W}{s_W} \right]$$

$$C_{121}(\bar{u}_-, u_Z, \gamma, W^-) = \left[ \frac{ie^2 \xi_\alpha c_W}{s_W} \right]$$

$$C_{122}(\bar{u}_+, u_Z, Z, W^+) = \left[ -\frac{ie^2 \xi_\beta c_W^2}{s_W^2} \right]$$

$$C_{123}(\bar{u}_-, u_Z, Z, W^-) = \left[ -\frac{ie^2 \xi_\beta c_W^2}{s_W^2} \right]$$

$$C_{124}(\bar{u}_-, u_-, W^-, W^+) = \left[ -ie^2 \left( \frac{\xi_\beta c_W^2}{s_W^2} + \xi_\alpha \right) \right]$$

$$C_{125}(\bar{u}_+, u_+, W^-, W^+) = \left[ -ie^2 \left( \frac{\xi_\beta c_W^2}{s_W^2} + \xi_\alpha \right) \right]$$

$$C_{126}(\bar{u}_-, u_+, W^-, W^-) = \left[ 2ie^2 \left( \frac{\xi_\beta c_W^2}{s_W^2} + \xi_\alpha \right) \right]$$

$$C_{127}(\bar{u}_+, u_-, W^+, W^+) = \left[ 2ie^2 \left( \frac{\xi_\beta c_W^2}{s_W^2} + \xi_\alpha \right) \right]$$

$$C_{128}(\bar{u}_-, u_-, \gamma, \gamma) = \left[ 2ie^2 \xi_\alpha \right]$$

$$C_{129}(\bar{u}_+, u_+, \gamma, \gamma) = \left[ 2ie^2 \xi_\alpha \right]$$

$$C_{130}(\bar{u}_-, u_-, \gamma, Z) = \left[ -\frac{ie^2 c_W}{s_W} (\xi_\alpha + \xi_\beta) \right]$$

$$C_{131}(\bar{u}_+, u_+, \gamma, Z) = \left[ -\frac{ie^2 c_W}{s_W} (\xi_\alpha + \xi_\beta) \right]$$

$$_{132} C(\bar{u}_-, u_-, Z, Z) = \left[ \frac{2ie^2 \xi_\beta c_W^2}{s_W^2} \right]$$

$$_{133} C(\bar{u}_+, u_+, Z, Z) = \left[ \frac{2ie^2 \xi_\beta c_W^2}{s_W^2} \right]$$

**[VVVV] 4 Gauge Bosons**

$$_{22} C(W^+, W^+, W^-, W^-) = \frac{ie^2}{s_W^2} \begin{bmatrix} 2 \\ -1 \\ -1 \end{bmatrix}$$

$$_{23} C(W^+, W^-, Z, Z) = \frac{e^2 c_W^2}{s_W^2} \begin{bmatrix} -2i \\ i - \frac{i\xi_\beta^2}{\xi_W} \\ i - \frac{i\xi_\beta^2}{\xi_W} \end{bmatrix}$$

$$_{24} C(W^+, W^-, \gamma, Z) = \frac{e^2 c_W}{s_W} \begin{bmatrix} 2i \\ -i + \frac{i\xi_\alpha \xi_\beta}{\xi_W} \\ -i + \frac{i\xi_\alpha \xi_\beta}{\xi_W} \end{bmatrix}$$

$$_{25} C(W^+, W^-, \gamma, \gamma) = e^2 \begin{bmatrix} -2i \\ i - \frac{i\xi_\alpha^2}{\xi_W} \\ i - \frac{i\xi_\alpha^2}{\xi_W} \end{bmatrix}$$