# MSSMQCD

[FFS] Gluino – Quark – Squark	2	[VVV] 3 Gluons	
		[SSVV] 2 Squarks – Gauge Boson – Gluon	
[FFV] 2 Quarks – Gluon	2	[SSVV] 2 Squarks – 2 Gluons	
[SSV] 2 Squarks – Gluon	3	[VVVV] 4 Gluons	
[UUV] 2 Ghosts – Gluon			

#### [FFS] Gluino - Quark - Squark

$$C_{g}\left(\tilde{g}, \overline{u}_{g2}, \tilde{u}_{g3}^{s3}\right) = \sqrt{2}ig_{s}\delta_{g2,g3}T_{c2,c3}^{g1}\begin{bmatrix} e_{Gl}^{*}U_{s3,2}^{\bar{u}_{g2}*} \\ -e_{Gl}U_{s3,1}^{\bar{u}_{g2}*} \end{bmatrix}$$

$$C_{10}\left(\tilde{g}, \overline{d}_{g2}, \tilde{d}_{g3}^{s3}\right) = \sqrt{2}ig_{s}\delta_{g2,g3}T_{c2,c3}^{g1}\begin{bmatrix} & e_{Gl}^{*}U_{s3,2}^{\tilde{d}_{g2}*} \\ & &$$

$$C_{11} \left( \tilde{g}, u_{\rm g2}, \tilde{u}_{\rm g3}^{\rm s3,\dagger} \right) = \sqrt{2} \mathrm{i} g_{\rm s} \delta_{\rm g2,g3} T_{\rm c3,c2}^{\rm g1} \left[ \begin{array}{c} - \mathrm{e}_{\rm Gl}^* U_{\rm s3,1}^{\tilde{u}_{\rm g2}} \\ - \mathrm{e}_{\rm Gl} U_{\rm s3,2}^{\tilde{u}_{\rm g2}} \end{array} \right]$$

$$C_{12}\left(\tilde{g}, d_{g2}, \tilde{d}_{g3}^{\text{s3},\dagger}\right) = \sqrt{2}ig_{s}\delta_{g2,g3}T_{c3,c2}^{g1} \begin{bmatrix} -e_{\text{Gl}}^{*}U_{\text{s3},1}^{\tilde{d}_{g2}} \\ -e_{\text{Gl}}U_{\text{s3},2}^{\tilde{d}_{g2}} \end{bmatrix}$$

#### [FFV] 2 Gluinos - Gluon

$$C_{6}(\tilde{g}, \tilde{g}, g) = -g_{s}f^{g1,g2,g3}\begin{bmatrix} 1\\ --\\ 1\end{bmatrix}$$

#### [FFV] 2 Quarks - Gluon

$$C_{4}(\overline{u}_{g1}, u_{g2}, g) = -ig_{s}\delta_{g1,g2}T_{c1,c2}^{g3}\begin{bmatrix} 1\\ -1\\ 1\end{bmatrix}$$

$$C_{5}\left(\overline{d}_{g1}, d_{g2}, g\right) = -ig_{5}\delta_{g1,g2}T_{c1,c2}^{g3}\begin{bmatrix} 1\\ --\\ 1\end{bmatrix}$$

#### [SSV] 2 Squarks - Gluon

$$C\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, g\right) = \left[-ig_s \delta_{g1,g2} \delta_{s1,s2} T_{c2,c1}^{g3}\right]$$

$$C_{8}\left(\tilde{d}_{g1}^{s1},\tilde{d}_{g2}^{s2,\dagger},g\right) = \left[-ig_{s}\delta_{g1,g2}\delta_{s1,s2}T_{c2,c1}^{g3}\right]$$

#### [UUV] 2 Ghosts - Gluon

$$C_{3}(\overline{u}_{g}, u_{g}, g) = g_{s}f^{g1,g2,g3}\begin{bmatrix} 1\\ -- \end{bmatrix}$$

#### [VVV] 3 Gluons

$$C(g,g,g) = \left[ g_{s}f^{g1,g2,g3} \right]$$

# [SSVV] 2 Squarks - Gauge Boson - Gluon

$$C_{15}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, g, \gamma\right) = \begin{bmatrix} \frac{4}{3} i e g_s \delta_{g1,g2} \delta_{s1,s2} T_{c2,c1}^{g3} \end{bmatrix}$$

$$C_{16}\left(\tilde{d}_{g1}^{s1}, \tilde{d}_{g2}^{s2,\dagger}, g, \gamma\right) = \begin{bmatrix} -\frac{2}{3} i e g_s \delta_{g1,g2} \delta_{s1,s2} T_{c2,c1}^{g3} \end{bmatrix}$$

$$C_{17}\left(\tilde{u}_{\mathrm{g1}}^{\mathrm{s1}}, \tilde{u}_{\mathrm{g2}}^{\mathrm{s2},\dagger}, g, Z\right) = \left[ -\frac{2\mathrm{i}eg_{\mathrm{s}}\delta_{\mathrm{g1,g2}}T_{\mathrm{c2,c1}}^{\mathrm{g3}}}{c_{\mathrm{W}}s_{\mathrm{W}}} \left(\frac{2}{3}\delta_{\mathrm{s1,s2}}s_{\mathrm{W}}^{2} - \frac{1}{2}U_{\mathrm{s1,1}}^{\tilde{u}_{\mathrm{g1}}*}U_{\mathrm{s2,1}}^{\tilde{u}_{\mathrm{g1}}}\right) \right]$$

$$C_{18}\left(\tilde{d}_{g1}^{s1},\tilde{d}_{g2}^{s2,\dagger},g,Z\right) = \left[ \frac{2ieg_{s}\delta_{g1,g2}T_{c2,c1}^{g3}}{c_{W}s_{W}}\left(\frac{1}{3}\delta_{s1,s2}s_{W}^{2} - \frac{1}{2}U_{s1,1}^{\tilde{d}_{g1}*}U_{s2,1}^{\tilde{d}_{g1}}\right) \right]$$

$$C_{19}\left(\tilde{u}_{g1}^{s1}, \tilde{d}_{g2}^{s2,\dagger}, g, W^{-}\right) = \left[\begin{array}{c} \frac{\sqrt{2}ieg_{s}CKM_{g1,g2}^{*}T_{c2,c1}^{g3}U_{s1,1}^{\tilde{u}_{g1}*}U_{s2,1}^{\tilde{d}_{g2}}}{s_{W}} \end{array}\right]$$

$$C_{20}\left(\tilde{d}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, g, W^{+}\right) = \left[\begin{array}{c} \frac{\sqrt{2}ieg_{s}CKM_{g2,g1}T_{c2,c1}^{g3}U_{s1,1}^{\tilde{d}_{g1}*}U_{s2,1}^{\tilde{u}_{g2}}}{s_{W}} \end{array}\right]$$

## [SSVV] 2 Squarks – 2 Gluons

$$C_{13}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, g, g\right) = \left[ig_s^2 \delta_{g1,g2} \delta_{s1,s2} \left( (T^{g3} T^{g4})_{c2,c1} + (T^{g4} T^{g3})_{c2,c1} \right)\right]$$

$$C_{14}\left(\tilde{d}_{g1}^{s1},\tilde{d}_{g2}^{s2,\dagger},g,g\right) = \left[ ig_s^2 \delta_{g1,g2} \delta_{s1,s2} \left( (T^{g3}T^{g4})_{c2,c1} + (T^{g4}T^{g3})_{c2,c1} \right) \right]$$

## [VVVV] 4 Gluons

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