$$F_4(x,y;\Gamma_1,\Gamma_2,\Gamma_3,\Gamma_4)^{q_1q_2q_3q_4} = \mathrm{Tr}\left[\Gamma_1 S_F^{q_1}(x,y)\Gamma_2 S_F^{q_2}(y,x)\Gamma_3 S_F^{q_3}(x,y)\Gamma_4 S_F^{q_4}(y,x)\right], \tag{1}$$

$$F_2(x,y;\Gamma_1,\Gamma_2)^{q_1q_2} = \mathrm{Tr}\left[\Gamma_1 S_F^{q_1}(x,y)\Gamma_2 S_F^{q_2}(y,x)\right], \tag{2}$$

$$F_4'(x,y;\Gamma_1,\Gamma_2,\Gamma_3,\Gamma_4)^{q_1q_2q_3q_4} = \mathrm{Tr}\left[\Gamma_1 S_F^{q_1}(x,x)\Gamma_2 S_F^{q_2}(x,y)\Gamma_3 S_F^{q_3}(y,y)\Gamma_4 S_F^{q_4}(y,x)\right] \tag{3}$$

$$F_3(x,y;\Gamma_1,\Gamma_2,\Gamma_3)^{q_1q_2q_3} = \mathrm{Tr}\left[\Gamma_1 S_F^{q_1}(x,x)\Gamma_2 S_F^{q_2}(x,y)\Gamma_3 S_F^{q_3}(y,x)\right], \tag{4}$$

$$F_1(x;\Gamma)^q = \mathrm{Tr}\left[\Gamma S_F^{q}(x,x)\right]. \tag{5}$$

(1-1): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\right\rangle$

$$= +\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\right\rangle - \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle, \tag{6}$$

(1-2): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\right\rangle$

$$= -\left\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{llll}\right\rangle + \left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle, \tag{7}$$

(1-3): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\right\rangle$

$$= +\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle - \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle, \tag{8}$$

(1-4): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\right\rangle$

$$= +\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle - \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle, \tag{9}$$

(1-5): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\right\rangle$

$$= -\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{c}\right\rangle, \tag{10}$$

(1-6): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\right\rangle$

$$= +\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{cll}\cdot F_1(y;\Gamma_\nu^-)^{l}\right\rangle, \tag{11}$$

(1-7): $\left\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\right\rangle$

$$= +\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^+)^{ll}\right\rangle - \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle, \tag{12}$$

$$\text{(1-8): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +2\Big\langle F_4(x,y;\Gamma^-_\mu, 1-\gamma_5, \Gamma^-_\mu, 1+\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{13}$$

$$\text{(1-9): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^+_\mu, \Gamma^-_\mu, \Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu, \Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{14}$$

$$\text{(1-10): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle$$
$$+ 2\Big\langle F_2(x,y;\Gamma^-_\mu, 1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \tag{15}$$

$$\text{(1-11): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu, \Gamma^+_\mu, \Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu, \Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{16}$$

$$\text{(1-12): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle$$
$$+ 2\Big\langle F_2(x,y;\Gamma^-_\mu, 1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \tag{17}$$

$$\text{(1-13): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu, \Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{c^*}\Big\rangle, \tag{18}$$

$$\text{(1-14): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{cll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{19}$$

$$\text{(1-15): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu, 1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\Big\rangle, \tag{20}$$

$$\text{(1-16): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_L](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu, 1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\Big\rangle, \tag{21}$$

$$\text{(2-1): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \tag{22}$$

$$\text{(2-2): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\Big\rangle - \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\Big\rangle, \tag{23}$$

$$\text{(2-3): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \tag{24}$$

$$\text{(2-4): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \tag{25}$$

$$\text{(2-5): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c}\Big\rangle, \tag{26}$$

$$\text{(2-6): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl}\Big\rangle, \tag{27}$$

$$\text{(2-7): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^+)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \tag{28}$$

$$\text{(2-8): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\Big\rangle + 2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle, \tag{29}$$

$$\text{(2-9): } \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \tag{30}$$

$$\text{(2-10)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle$$
$$-2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{ll\prime}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \tag{31}$$

$$\text{(2-11)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\Big\rangle$$
$$+\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{ll\prime}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \tag{32}$$

$$\text{(2-12)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle$$
$$-2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{ll\prime}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \tag{33}$$

$$\text{(2-13)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{ll\prime}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\Big\rangle, \tag{34}$$

$$\text{(2-14)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llcl}\Big\rangle, \tag{35}$$

$$\text{(2-15)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{ll\prime}\Big\rangle, \tag{36}$$

$$\text{(2-16)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_L](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{ll\prime}\Big\rangle, \tag{37}$$

$$\text{(3-1)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{ll\prime}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle$$
$$-\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \tag{38}$$

$$\text{(3-2)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\Big\rangle$$
$$+\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{ll\prime}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \tag{39}$$

$$
\begin{aligned}
\text{(3-3)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\mu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\Big\rangle \\
&\quad - \Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \qquad (40)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-4)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \qquad (41)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-5)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle, \qquad (42)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-6)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\nu)^{llcl}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{cll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \qquad (43)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-7)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (44)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-8)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (45)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-9)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\mu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^+_\nu)^{ll}\Big\rangle \\
&\quad - \Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^+_\nu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (46)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-10)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F_4(x,y;\Gamma^-_\mu,1-\gamma_5,\Gamma^-_\mu,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\Big\rangle \\
&\quad + 2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (47)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-11)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (48)
\end{aligned}
$$

$$
\begin{aligned}
\text{(3-12)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_L](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (49)
\end{aligned}
$$

$$\text{(3-13)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_L](x) [(\bar{c}_\gamma c_\gamma)_R (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle$$
$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{c*} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \cdot F_1(y;\Gamma_\nu^-)^{c*} \Big\rangle, \tag{50}$$

$$\text{(3-14)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_L](x) [(\bar{c}_\gamma c_\delta)_R (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle$$
$$= +2 \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llcl} \Big\rangle$$
$$- 2 \Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll} \cdot F_1(y;\Gamma_\nu^-)^{l*} \Big\rangle, \tag{51}$$

$$\text{(3-15)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_L](x) [\bar{s}_\gamma (1+\gamma_5) d_\gamma](y) \big|_{(I)} \Big\rangle$$
$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \Big\rangle, \tag{52}$$

$$\text{(3-16)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_L](x) [\bar{s}_\gamma (1-\gamma_5) d_\gamma](y) \big|_{(I)} \Big\rangle$$
$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \Big\rangle, \tag{53}$$

$$\text{(4-1)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_L](x) [(\bar{u}_\gamma u_\gamma)_L (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle$$
$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle, \tag{54}$$

$$\text{(4-2)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_L](x) [(\bar{u}_\gamma u_\delta)_L (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle$$
$$= - \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll} \Big\rangle$$
$$+ \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle, \tag{55}$$

$$\text{(4-3)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_L](x) [(\bar{d}_\gamma d_\gamma)_L (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle$$
$$= - \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll} \Big\rangle$$
$$+ \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle$$
$$+ \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle, \tag{56}$$

$$
\begin{aligned}
\text{(4-4)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\mu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\Big\rangle \\
&\quad - \Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \qquad (57)
\end{aligned}
$$

$$
\begin{aligned}
\text{(4-5)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle, \qquad (58)
\end{aligned}
$$

$$
\begin{aligned}
\text{(4-6)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\nu)^{llcl}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{cll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \qquad (59)
\end{aligned}
$$

$$
\begin{aligned}
\text{(4-7)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (60)
\end{aligned}
$$

$$
\begin{aligned}
\text{(4-8)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (61)
\end{aligned}
$$

$$
\begin{aligned}
\text{(4-9)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^+_\nu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (62)
\end{aligned}
$$

(4-10): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle \\
&\quad +2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (63)
\end{aligned}
$$

(4-11): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^+)^{llll}\Big\rangle \\
&\quad +\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^+)^{ll}\Big\rangle \\
&\quad -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\Big\rangle \\
&\quad +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle \\
&\quad +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad -\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \qquad (64)
\end{aligned}
$$

(4-12): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4(x,y;\Gamma_\mu^-,1-\gamma_5,\Gamma_\mu^-,1+\gamma_5)^{llll}\Big\rangle \\
&\quad -2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\Big\rangle \\
&\quad +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad +2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (65)
\end{aligned}
$$

(4-13): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\Big\rangle \\
&\quad -\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\Big\rangle, \qquad (66)
\end{aligned}
$$

(4-14): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llcl}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \qquad (67)
\end{aligned}
$$

$$\text{(4-15): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5)^{lll}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{68}$$

$$\text{(4-16): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_L](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1-\gamma_5)^{lll}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{69}$$

$$\text{(5-1): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^+_\nu)^{ll}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{70}$$

$$\text{(5-2): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\mu,\Gamma^+_\nu)^{llll}\Big\rangle$$
$$+ \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{71}$$

$$\text{(5-3): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{72}$$

$$\text{(5-4): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{73}$$

$$\text{(5-5): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^c\Big\rangle, \tag{74}$$

$$\text{(5-6): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{cll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{75}$$

$$\text{(5-7): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll^*}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{76}$$

$$\text{(5-8): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +2\Big\langle F_4(x,y;\Gamma^-_\mu, 1+\gamma_5, \Gamma^+_\mu, 1-\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^l\Big\rangle, \tag{77}$$

$$\text{(5-9): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^+_\mu, \Gamma^-_\mu, \Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu, \Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{78}$$

$$\text{(5-10): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^l\Big\rangle$$
$$+ 2\Big\langle F_2(x,y;\Gamma^-_\mu, 1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;1+\gamma_5)^l\Big\rangle, \tag{79}$$

$$\text{(5-11): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu, \Gamma^+_\mu, \Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu, \Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \tag{80}$$

$$\text{(5-12): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^l\Big\rangle$$
$$+ 2\Big\langle F_2(x,y;\Gamma^-_\mu, 1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;1-\gamma_5)^l\Big\rangle, \tag{81}$$

$$\text{(5-13): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu, \Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^{c^*}\Big\rangle, \tag{82}$$

$$\text{(5-14): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{cll}\cdot F_1(y;\Gamma^-_\nu)^l\Big\rangle, \tag{83}$$

$$\text{(5-15): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu, 1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{84}$$

$$\text{(5-16): } \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{u}_\beta u_\beta)_R](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu, 1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{85}$$

(6-1): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F_4(x,y;\Gamma^-_\mu, 1-\gamma_5, \Gamma^-_\mu, 1+\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{86}$$

(6-2): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_2(x,y;\Gamma^-_\mu, 1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma^-_\mu, 1+\gamma_5)^{ll}\Big\rangle$$
$$+ 2\Big\langle F'_4(x,y;\Gamma^-_\mu, \Gamma^-_\mu, 1+\gamma_5, 1-\gamma_5)^{llll}\Big\rangle, \tag{87}$$

(6-3): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F'_4(x,y;\Gamma^-_\mu, \Gamma^-_\mu, 1+\gamma_5, 1-\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{88}$$

(6-4): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F'_4(x,y;\Gamma^-_\mu, \Gamma^-_\mu, 1+\gamma_5, 1-\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{89}$$

(6-5): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{c*}\Big\rangle, \tag{90}$$

(6-6): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F'_4(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu, \Gamma^+_\nu)^{llcl}\Big\rangle, \tag{91}$$

(6-7): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F_4(x,y;\Gamma^-_\mu, 1+\gamma_5, \Gamma^+_\mu, 1-\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \tag{92}$$

(6-8): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= +4\Big\langle F_2(x,y;1-\gamma_5, 1+\gamma_5)^{ll}\cdot F_2(x,y;1+\gamma_5, 1-\gamma_5)^{ll}\Big\rangle$$
$$- 4\Big\langle F'_4(x,y;1-\gamma_5, 1+\gamma_5, 1-\gamma_5, 1+\gamma_5)^{llll}\Big\rangle, \tag{93}$$

(6-9): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F'_4(x,y;\Gamma^+_\mu, \Gamma^-_\mu, 1-\gamma_5, 1+\gamma_5)^{llll}\Big\rangle$$
$$- 2\Big\langle F_3(x,y;1-\gamma_5, 1+\gamma_5, \Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \tag{94}$$

(6-10): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle, \tag{95}$$

(6-11): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \tag{96}$$

(6-12): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle, \tag{97}$$

(6-13): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c}\Big\rangle, \tag{98}$$

(6-14): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llcl}\Big\rangle, \tag{99}$$

(6-15): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle, \tag{100}$$

(6-16): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle, \tag{101}$$

(7-1): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle - \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \tag{102}$$

(7-2): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle, \tag{103}$$

$$
\begin{aligned}
\text{(7-3)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\mu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^+_\nu)^{ll}\Big\rangle \\
&\quad - \Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (104)
\end{aligned}
$$

$$
\begin{aligned}
\text{(7-4)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (105)
\end{aligned}
$$

$$
\begin{aligned}
\text{(7-5)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle, \qquad (106)
\end{aligned}
$$

$$
\begin{aligned}
\text{(7-6)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu,\Gamma^-_\nu)^{llcl}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{cll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (107)
\end{aligned}
$$

$$
\begin{aligned}
\text{(7-7)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\cdot F_1(y;\Gamma^-_\nu)^{l^*}\Big\rangle, \qquad (108)
\end{aligned}
$$

$$
\begin{aligned}
\text{(7-8)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^+_\mu,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle, \qquad (109)
\end{aligned}
$$

(7-9): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^+_\mu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll*}\Big\rangle \\
&\quad - \Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^+_\nu,\Gamma^-_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l*}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \qquad (110)
\end{aligned}
$$

(7-10): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4(x,y;\Gamma^-_\mu,1+\gamma_5,\Gamma^+_\mu,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll*}\Big\rangle \\
&\quad + 2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^+_\mu,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l*}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (111)
\end{aligned}
$$

(7-11): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu,\Gamma^+_\nu)^{llll}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l*}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \qquad (112)
\end{aligned}
$$

(7-12): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{d}_\beta d_\beta)_R](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^+_\mu,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l*}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (113)
\end{aligned}
$$

(7-13): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_R](x) [(\bar{c}_\gamma c_\gamma)_R (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle$

$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{c*} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l*} \cdot F_1(y;\Gamma_\nu^-)^{c*} \Big\rangle, \tag{114}$$

(7-14): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_R](x) [(\bar{c}_\gamma c_\delta)_R (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle$

$$= +2 \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llcl} \Big\rangle$$
$$- 2 \Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle, \tag{115}$$

(7-15): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_R](x) [\bar{s}_\gamma (1+\gamma_5) d_\gamma](y) \big|_{(I)} \Big\rangle$

$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1+\gamma_5)^{lll} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l*} \Big\rangle, \tag{116}$$

(7-16): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{d}_\beta d_\beta)_R](x) [\bar{s}_\gamma (1-\gamma_5) d_\gamma](y) \big|_{(I)} \Big\rangle$

$$= + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5)^{lll} \Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l*} \Big\rangle, \tag{117}$$

(8-1): $\Big\langle [(\bar{s}_\alpha d_\beta)_L (\bar{d}_\beta d_\alpha)_R](x) [(\bar{u}_\gamma u_\gamma)_L (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle$

$$= -2 \Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l*} \Big\rangle$$
$$+ 2 \Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \cdot F_1(y;1-\gamma_5)^{l} \Big\rangle, \tag{118}$$

(8-2): $\Big\langle [(\bar{s}_\alpha d_\beta)_L (\bar{d}_\beta d_\alpha)_R](x) [(\bar{u}_\gamma u_\delta)_L (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle$

$$= +2 \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll} \Big\rangle$$
$$- 2 \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll} \cdot F_1(y;1-\gamma_5)^{l} \Big\rangle, \tag{119}$$

(8-3): $\Big\langle [(\bar{s}_\alpha d_\beta)_L (\bar{d}_\beta d_\alpha)_R](x) [(\bar{d}_\gamma d_\gamma)_L (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle$

$$= +2 \Big\langle F_4(x,y;\Gamma_\mu^-,1-\gamma_5,\Gamma_\mu^-,1+\gamma_5)^{llll} \Big\rangle$$
$$- 2 \Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll} \cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll} \Big\rangle$$
$$+ 2 \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll} \Big\rangle$$
$$- 2 \Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l*} \Big\rangle$$
$$- 2 \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll} \cdot F_1(y;1-\gamma_5)^{l} \Big\rangle$$
$$+ 2 \Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l} \cdot F_1(y;1-\gamma_5)^{l} \Big\rangle, \tag{120}$$

(8-4): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (121)
\end{aligned}
$$

(8-5): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (122)
\end{aligned}
$$

(8-6): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{llcl}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{cll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (123)
\end{aligned}
$$

(8-7): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (124)
\end{aligned}
$$

(8-8): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle, \qquad (125)
\end{aligned}
$$

(8-9): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4(x,y;\Gamma_\mu^-,1+\gamma_5,\Gamma_\mu^+,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll^*}\Big\rangle \\
&\quad + 2\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (126)
\end{aligned}
$$

$$
\begin{aligned}
\text{(8-10)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= -4\Big\langle F_4(x,y;1-\gamma_5,1-\gamma_5,1+\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\Big\rangle \\
&\quad - 4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle \\
&\quad - 4\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (127)
\end{aligned}
$$

$$
\begin{aligned}
\text{(8-11)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (128)
\end{aligned}
$$

$$
\begin{aligned}
\text{(8-12)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle \\
&\quad - 4\Big\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (129)
\end{aligned}
$$

$$
\begin{aligned}
\text{(8-13)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (130)
\end{aligned}
$$

$$
\begin{aligned}
\text{(8-14)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llcl}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle, \qquad (131)
\end{aligned}
$$

$$
\begin{aligned}
\text{(8-15)}: \Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle \\
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\Big\rangle, \qquad (132)
\end{aligned}
$$

(8-16): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{d}_\beta d_\alpha)_R](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle + 2\Big\langle F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\Big\rangle, \tag{133}$$

(9-1): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{134}$$

(9-2): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^+_\nu,\Gamma^-_\nu)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{135}$$

(9-3): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^+_\nu,\Gamma^-_\nu)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{136}$$

(9-4): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_4(x,y;\Gamma^-_\mu,\Gamma^-_\nu,\Gamma^-_\mu,\Gamma^+_\nu)^{llll}\Big\rangle + \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_2(x,y;\Gamma^-_\mu,\Gamma^+_\nu)^{ll}\Big\rangle - \Big\langle F'_4(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^+_\nu,\Gamma^-_\nu)^{llll}\Big\rangle + \Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l}\Big\rangle + \Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l}\cdot F_1(y;\Gamma^-_\nu)^{l*}\Big\rangle, \tag{137}$$

(9-5): $\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,\Gamma^-_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle - \Big\langle F_2(x,y;\Gamma^-_\mu,\Gamma^-_\nu)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l*}\cdot F_1(y;\Gamma^-_\nu)^{c}\Big\rangle, \tag{138}$$

$$
\begin{aligned}
\text{(9-6)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_R](x) [(\bar{c}_\gamma c_\delta)_L (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle & \\
&= -\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl} \Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{cll} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle, \qquad (139) \\
\text{(9-7)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_R](x) [(\bar{u}_\gamma u_\gamma)_R (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle & \\
&= +\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l^*} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle, \qquad (140) \\
\text{(9-8)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_R](x) [(\bar{u}_\gamma u_\delta)_R (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle & \\
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll} \Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle, \qquad (141) \\
\text{(9-9)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_R](x) [(\bar{d}_\gamma d_\gamma)_R (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle & \\
&= -\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{llll} \Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l^*} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle, \qquad (142) \\
\text{(9-10)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_R](x) [(\bar{d}_\gamma d_\delta)_R (\bar{d}_\delta s_\gamma)_L](y) \big|_{(I)} \Big\rangle & \\
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll} \Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5)^{lll} \cdot F_1(y;1+\gamma_5)^{l} \Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l} \Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l^*} \cdot F_1(y;1+\gamma_5)^{l} \Big\rangle, \qquad (143) \\
\text{(9-11)}: \Big\langle [(\bar{s}_\alpha d_\alpha)_L (\bar{s}_\beta s_\beta)_R](x) [(\bar{s}_\gamma s_\gamma)_R (\bar{d}_\delta s_\delta)_L](y) \big|_{(I)} \Big\rangle & \\
&= -\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^+,\Gamma_\nu^+)^{llll} \Big\rangle \\
&\quad + \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll^*} \Big\rangle \\
&\quad - \Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^+,\Gamma_\nu^-)^{llll} \Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle \\
&\quad + \Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle \\
&\quad - \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll} \cdot F_1(x;\Gamma_\mu^-)^{l^*} \cdot F_1(y;\Gamma_\nu^-)^{l^*} \Big\rangle, \qquad (144)
\end{aligned}
$$

$$
\begin{aligned}
\text{(9-12)}:\ &\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F_4(x,y;\Gamma_\mu^-,1+\gamma_5,\Gamma_\mu^+,1-\gamma_5)^{llll}\Big\rangle \\
&\quad -2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll*}\Big\rangle \\
&\quad +2\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle \\
&\quad +2\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (145)
\end{aligned}
$$

$$
\begin{aligned}
\text{(9-13)}:\ &\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c*}\Big\rangle \\
&\quad -\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\cdot F_1(y;\Gamma_\nu^-)^{c*}\Big\rangle, \qquad (146)
\end{aligned}
$$

$$
\begin{aligned}
\text{(9-14)}:\ &\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llcl}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle, \qquad (147)
\end{aligned}
$$

$$
\begin{aligned}
\text{(9-15)}:\ &\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1+\gamma_5)^{lll}\Big\rangle \\
&\quad -\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\Big\rangle, \qquad (148)
\end{aligned}
$$

$$
\begin{aligned}
\text{(9-16)}:\ &\Big\langle [(\bar{s}_\alpha d_\alpha)_L(\bar{s}_\beta s_\beta)_R](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle \\
&= +\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5)^{lll}\Big\rangle \\
&\quad -\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\Big\rangle, \qquad (149)
\end{aligned}
$$

$$
\begin{aligned}
\text{(10-1)}:\ &\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle \\
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l*}\Big\rangle \\
&\quad +2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (150)
\end{aligned}
$$

$$
\begin{aligned}
\text{(10-2)}:\ &\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle \\
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad -2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (151)
\end{aligned}
$$

(10-3): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (152)
\end{aligned}
$$

(10-4): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4(x,y;\Gamma_\mu^-,1-\gamma_5,\Gamma_\mu^-,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\Big\rangle \\
&\quad + 2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (153)
\end{aligned}
$$

(10-5): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (154)
\end{aligned}
$$

(10-6): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{llcl}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{cll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (155)
\end{aligned}
$$

(10-7): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (156)
\end{aligned}
$$

(10-8): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle, \qquad (157)
\end{aligned}
$$

(10-9): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (158)
\end{aligned}
$$

(10-10): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle \\
&\quad - 4\Big\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (159)
\end{aligned}
$$

(10-11): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= +2\Big\langle F_4(x,y;\Gamma_\mu^-,1+\gamma_5,\Gamma_\mu^+,1-\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll^*}\Big\rangle \\
&\quad + 2\Big\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle \\
&\quad - 2\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle \\
&\quad + 2\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle, \qquad (160)
\end{aligned}
$$

(10-12): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$
\begin{aligned}
&= -4\Big\langle F_4(x,y;1-\gamma_5,1-\gamma_5,1+\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\Big\rangle \\
&\quad - 4\Big\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle \\
&\quad + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\Big\rangle \\
&\quad - 4\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle, \qquad (161)
\end{aligned}
$$

(10-13): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma^+_\nu)^{lll}\cdot F_1(y;\Gamma^-_\nu)^c\Big\rangle + 2\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{c*}\cdot F_1(y;1+\gamma_5)^l\Big\rangle, \tag{162}$$

(10-14): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -4\Big\langle F'_4(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llcl}\Big\rangle + 4\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll}\cdot F_1(y;1+\gamma_5)^{l^*}\Big\rangle, \tag{163}$$

(10-15): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle + 2\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^l\Big\rangle, \tag{164}$$

(10-16): $\Big\langle [(\bar{s}_\alpha d_\beta)_L(\bar{u}_\beta u_\alpha)_R](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle + 2\Big\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^l\Big\rangle, \tag{165}$$

(11-1): $\Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{166}$$

(11-2): $\Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1-\gamma_5)^{lll}\Big\rangle, \tag{167}$$

(11-3): $\Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1-\gamma_5)^{lll}\Big\rangle - \Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{168}$$

(11-4): $\Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1-\gamma_5)^{lll}\Big\rangle - \Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{169}$$

(11-5): $\Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^c\Big\rangle, \tag{170}$$

$$\text{(11-6):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1-\gamma_5)^{cll}\Big\rangle, \tag{171}$$

$$\text{(11-7):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{172}$$

$$\text{(11-8):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle, \tag{173}$$

$$\text{(11-9):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,1-\gamma_5)^{lll}\Big\rangle$$
$$-\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{174}$$

$$\text{(11-10):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle$$
$$+2\Big\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\Big\rangle, \tag{175}$$

$$\text{(11-11):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^+_\mu,1-\gamma_5)^{lll}\Big\rangle$$
$$-\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{176}$$

$$\text{(11-12):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle$$
$$+2\Big\langle F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\Big\rangle, \tag{177}$$

$$\text{(11-13):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{c^*}\Big\rangle, \tag{178}$$

$$\text{(11-14):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll}\Big\rangle, \tag{179}$$

$$\text{(11-15):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\Big\rangle, \tag{180}$$

$$\text{(11-16):}\ \Big\langle [\bar{s}_\alpha(1-\gamma_5)d_\alpha](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\Big\rangle, \tag{181}$$

$$\text{(12-1)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{182}$$

$$\text{(12-2)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5)^{lll}\Big\rangle, \tag{183}$$

$$\text{(12-3)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{d}_\gamma d_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5)^{lll}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{184}$$

$$\text{(12-4)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{s}_\gamma s_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5)^{lll}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^l\Big\rangle, \tag{185}$$

$$\text{(12-5)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\gamma)_L(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^c\Big\rangle, \tag{186}$$

$$\text{(12-6)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\delta)_L(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^-_\mu,\Gamma^-_\mu,1+\gamma_5)^{cll}\Big\rangle, \tag{187}$$

$$\text{(12-7)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= -\Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{188}$$

$$\text{(12-8)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{u}_\gamma u_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle, \tag{189}$$

$$\text{(12-9)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{d}_\gamma d_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$$
$$= +\Big\langle F_3(x,y;\Gamma^+_\mu,\Gamma^-_\mu,1+\gamma_5)^{lll}\Big\rangle$$
$$- \Big\langle F_2(x,y;\Gamma^-_\mu,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma^-_\mu)^{l^*}\Big\rangle, \tag{190}$$

$$\text{(12-10)}: \Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{d}_\gamma d_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$$
$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle$$
$$+ 2\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^l\Big\rangle, \tag{191}$$

(12-11): $\Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{s}_\gamma s_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= +\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1+\gamma_5)^{lll}\Big\rangle - \Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\Big\rangle, \tag{192}$$

(12-12): $\Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{s}_\gamma s_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle + 2\Big\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\Big\rangle, \tag{193}$$

(12-13): $\Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\gamma)_R(\bar{d}_\delta s_\delta)_L](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c*}\Big\rangle, \tag{194}$$

(12-14): $\Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[(\bar{c}_\gamma c_\delta)_R(\bar{d}_\delta s_\gamma)_L](y)\big|_{(I)}\Big\rangle$

$$= -2\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll}\Big\rangle, \tag{195}$$

(12-15): $\Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[\bar{s}_\gamma(1+\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\Big\rangle, \tag{196}$$

(12-16): $\Big\langle [\bar{s}_\alpha(1+\gamma_5)d_\alpha](x)[\bar{s}_\gamma(1-\gamma_5)d_\gamma](y)\big|_{(I)}\Big\rangle$

$$= -\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\Big\rangle. \tag{197}$$

F_4-type: 6 independent contractions (including 0 charm-contained ones) / 9 total contractions:

$$\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{llll}\Big\rangle$$
$$\Big\langle F_4(x,y;\Gamma_\mu^-,1-\gamma_5,\Gamma_\mu^-,1+\gamma_5)^{llll}\Big\rangle = \Big\langle F_4(x,y;1-\gamma_5,\Gamma_\nu^-,1+\gamma_5,\Gamma_\nu^-)^{llll}\Big\rangle$$
$$\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^+)^{llll}\Big\rangle = \Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{llll}\Big\rangle$$
$$\Big\langle F_4(x,y;\Gamma_\mu^-,1+\gamma_5,\Gamma_\mu^+,1-\gamma_5)^{llll}\Big\rangle = \Big\langle F_4(x,y;1-\gamma_5,\Gamma_\nu^-,1+\gamma_5,\Gamma_\nu^+)^{llll}\Big\rangle$$
$$\Big\langle F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^+,\Gamma_\nu^+)^{llll}\Big\rangle$$
$$\Big\langle F_4(x,y;1-\gamma_5,1-\gamma_5,1+\gamma_5,1+\gamma_5)^{llll}\Big\rangle$$

$F_{2,2}$-type: 6 independent contractions (including 0 charm-contained ones) / 9 total contractions:

$$\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\Big\rangle$$
$$\Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^+)^{ll}\Big\rangle = \Big\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^+)^{ll*}\Big\rangle$$

$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll^*}\right\rangle$$
$$\left\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll^*}\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll^*}\right\rangle$$

F_4'-type: 18 independent contractions (including 8 charm-contained ones) / 32 total contractions:

$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{llll}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-,\Gamma_\nu^-)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llcl}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{llcl}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^-)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llll}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llcl}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^+,\Gamma_\nu^-)^{llll}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-,\Gamma_\nu^+)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llcl}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^-,\Gamma_\nu^+)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl}\right\rangle = \left\langle F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{clll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{llll}\right\rangle$$
$$\left\langle F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llcl}\right\rangle = \left\langle F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^-)^{clll}\right\rangle$$

$F_{3,1}$-type: 32 independent contractions (including 16 charm-contained ones) / 64 total contractions:

$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{cll}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{cll}\cdot F_1(x;\Gamma_\mu^-)^l\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^l\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{cll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^c\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1-\gamma_5)^{lll}\cdot F_1(x;1+\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1+\gamma_5)^{lll}\cdot F_1(x;1-\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{cll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{cll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{lll}\cdot F_1(x;\Gamma_\mu^-)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{cll}\cdot F_1(x;\Gamma_\mu^-)^l\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^{l^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\cdot F_1(x;1+\gamma_5)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^{l^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\cdot F_1(x;1-\gamma_5)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll}\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{lll}\cdot F_1(x;\Gamma_\mu^-)^c\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^c\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,1-\gamma_5)^{lll}\cdot F_1(x;1+\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,1+\gamma_5)^{lll}\cdot F_1(x;1-\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{cll}\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1+\gamma_5)^{cll}\cdot F_1(x;1-\gamma_5)^l\right\rangle$$

$$\left\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1+\gamma_5)^{lll}\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,1+\gamma_5)^{lll}\cdot F_1(x;1-\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll}\cdot F_1(y;1-\gamma_5)^{l^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll}\cdot F_1(x;1-\gamma_5)^{l^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^c\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5)^{lll}\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,1-\gamma_5)^{lll}\cdot F_1(x;1+\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,\Gamma_\mu^-)^{lll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\right\rangle$$
$$\left\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{cll}\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1-\gamma_5)^{cll}\cdot F_1(x;1+\gamma_5)^l\right\rangle$$
$$\left\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll}\cdot F_1(y;1+\gamma_5)^{l^*}\right\rangle = \left\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll}\cdot F_1(x;1+\gamma_5)^{l^*}\right\rangle$$

$F_{2,1,1}$-type: 18 independent contractions (including 8 charm-contained ones) / 32 total contractions:

$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^l\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^l\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle = \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^c\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^l\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle = \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^l\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1+\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^l\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1-\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^l\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle = \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\cdot F_1(y;\Gamma_\nu^-)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle = \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^c\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1+\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1-\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l^*}\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle = \left\langle F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\cdot F_1(y;\Gamma_\nu^-)^{l^*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^c\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1-\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle$$
$$\left\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^l\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^l\cdot F_1(y;1+\gamma_5)^l\right\rangle$$
$$\left\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^l\cdot F_1(y;1-\gamma_5)^l\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c^*}\cdot F_1(y;1-\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1-\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^{c^*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^c\cdot F_1(y;1+\gamma_5)^l\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1+\gamma_5)^l\cdot F_1(y;\Gamma_\nu^-)^c\right\rangle$$

$$\Big\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle$$
$$\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c*}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle=\Big\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\cdot F_1(y;\Gamma_\nu^-)^{c*}\Big\rangle$$

F_3-type: 12 independent contractions (including 4 charm-contained ones) / 24 total contractions:

$$\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1+\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1-\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1+\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,1+\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,1-\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1+\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,1+\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5)^{lll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,1-\gamma_5)^{lll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{cll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1-\gamma_5)^{cll}\Big\rangle$$
$$\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll}\Big\rangle=\Big\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll}\Big\rangle$$
$$\Big\langle F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{cll}\Big\rangle=\Big\langle F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1+\gamma_5)^{cll}\Big\rangle$$
$$\Big\langle F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll}\Big\rangle=\Big\langle F_3(y,x;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll}\Big\rangle$$

$F_{2,1}$-type: 12 independent contractions (including 4 charm-contained ones) / 24 total contractions:

$$\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\Big\rangle=\Big\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle$$
$$\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l}\Big\rangle=\Big\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{l}\Big\rangle$$
$$\Big\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\Big\rangle=\Big\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{l*}\Big\rangle$$
$$\Big\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{l*}\Big\rangle=\Big\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{l*}\Big\rangle$$
$$\Big\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\Big\rangle=\Big\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle$$
$$\Big\langle F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1-\gamma_5)^{l}\Big\rangle=\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(y;1-\gamma_5)^{l}\Big\rangle$$
$$\Big\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\Big\rangle=\Big\langle F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\cdot F_1(y;1+\gamma_5)^{l}\Big\rangle$$

$$\left\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\cdot F_1(x;1+\gamma_5)^{l}\right\rangle = \left\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\cdot F_1(y;1+\gamma_5)^{l}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c}\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{c}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c*}\right\rangle = \left\langle F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{c*}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c}\right\rangle = \left\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{c}\right\rangle$$
$$\left\langle F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll}\cdot F_1(x;\Gamma_\mu^-)^{c*}\right\rangle = \left\langle F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll}\cdot F_1(y;\Gamma_\nu^-)^{c*}\right\rangle$$

F_2-type: 3 independent contractions (including 0 charm-contained ones) / 4 total contractions:

$$\left\langle F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll}\right\rangle = \left\langle F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll}\right\rangle$$
$$\left\langle F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll}\right\rangle$$
$$\left\langle F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll}\right\rangle$$

F_4-type: 9 traces to be taken:

$$F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{llll},$$
$$F_4(x,y;\Gamma_\mu^-,1-\gamma_5,\Gamma_\mu^-,1+\gamma_5)^{llll},$$
$$F_4(x,y;1-\gamma_5,\Gamma_\nu^-,1+\gamma_5,\Gamma_\nu^-)^{llll},$$
$$F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^-,\Gamma_\nu^+)^{llll},$$
$$F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{llll},$$
$$F_4(x,y;\Gamma_\mu^-,1+\gamma_5,\Gamma_\mu^+,1-\gamma_5)^{llll},$$
$$F_4(x,y;1-\gamma_5,\Gamma_\nu^-,1+\gamma_5,\Gamma_\nu^+)^{llll},$$
$$F_4(x,y;\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\mu^+,\Gamma_\nu^+)^{llll},$$
$$F_4(x,y;1-\gamma_5,1-\gamma_5,1+\gamma_5,1+\gamma_5)^{llll},$$

F_4'-type: 32 traces to be taken:

$$F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll},$$
$$F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl},$$
$$F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{cll},$$
$$F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llll},$$
$$F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{llll},$$

$$
\begin{aligned}
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{llll},\\
&F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-,\Gamma_\nu^-)^{llll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{llcl},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{clll},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^+)^{llcl},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5,1-\gamma_5)^{clll},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llll},\\
&F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llll},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^-)^{llll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llll},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^-,\Gamma_\nu^+)^{llll},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{llcl},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5,1+\gamma_5)^{clll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{clll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^+,\Gamma_\nu^-)^{llll},\\
&F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^+)^{llll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-,\Gamma_\nu^+)^{llll},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5,1+\gamma_5)^{llcl},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^-,\Gamma_\nu^+)^{clll},\\
&F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-,\Gamma_\nu^-)^{llcl},\\
&F_4'(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{clll},\\
&F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^+,\Gamma_\nu^-)^{llll},\\
&F_4'(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5,1+\gamma_5)^{llcl},\\
&F_4'(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+,\Gamma_\nu^-)^{clll},
\end{aligned}
$$

$F_{3,x}$-type: 18 traces to be taken:

$$
\begin{aligned}
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,\Gamma_\nu^-)^{cll},\\
&F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{lll},
\end{aligned}
$$

$$
\begin{aligned}
&F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,\Gamma_\nu^-)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,\Gamma_\nu^-)^{lll},\\
&F_3(x,y;1-\gamma_5,1+\gamma_5,\Gamma_\nu^+)^{cll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{lll},\\
&F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll},\\
&F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1-\gamma_5)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^+,1+\gamma_5)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1+\gamma_5)^{cll},\\
&F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1+\gamma_5)^{lll},\\
&F_3(x,y;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll},\\
&F_3(x,y;\Gamma_\mu^+,\Gamma_\mu^-,1-\gamma_5)^{lll},\\
&F_3(x,y;\Gamma_\mu^-,\Gamma_\mu^-,1-\gamma_5)^{cll},\\
&F_3(x,y;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll},
\end{aligned}
$$

$F_{3,y}$-type: 18 traces to be taken:

$$
\begin{aligned}
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{lll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,\Gamma_\mu^-)^{cll},\\
&F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{lll},\\
&F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,\Gamma_\mu^-)^{lll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,\Gamma_\mu^-)^{lll},\\
&F_3(y,x;1-\gamma_5,1+\gamma_5,\Gamma_\mu^+)^{cll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1-\gamma_5)^{lll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1+\gamma_5)^{lll},\\
&F_3(y,x;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{lll},\\
&F_3(y,x;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{lll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,1-\gamma_5)^{lll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^+,1+\gamma_5)^{lll},\\
&F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1+\gamma_5)^{cll},\\
&F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,1+\gamma_5)^{lll},\\
&F_3(y,x;1-\gamma_5,1+\gamma_5,1+\gamma_5)^{cll},
\end{aligned}
$$

$$F_3(y,x;\Gamma_\nu^+,\Gamma_\nu^-,1-\gamma_5)^{lll},$$
$$F_3(y,x;\Gamma_\nu^-,\Gamma_\nu^-,1-\gamma_5)^{cll},$$
$$F_3(y,x;1-\gamma_5,1+\gamma_5,1-\gamma_5)^{cll},$$

F_2-type: 10 traces to be taken:

$$F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^-)^{ll},$$
$$F_2(x,y;\Gamma_\mu^-,\Gamma_\nu^+)^{ll},$$
$$F_2(x,y;\Gamma_\mu^-,1-\gamma_5)^{ll},$$
$$F_2(x,y;\Gamma_\mu^-,1+\gamma_5)^{ll},$$
$$F_2(x,y;1-\gamma_5,\Gamma_\nu^-)^{ll},$$
$$F_2(x,y;1+\gamma_5,\Gamma_\nu^-)^{ll},$$
$$F_2(x,y;1-\gamma_5,1+\gamma_5)^{ll},$$
$$F_2(x,y;1+\gamma_5,1-\gamma_5)^{ll},$$
$$F_2(x,y;1+\gamma_5,1+\gamma_5)^{ll},$$
$$F_2(x,y;1-\gamma_5,1-\gamma_5)^{ll},$$

$F_{1,x}$-type: 4 traces to be taken:

$$F_1(x;\Gamma_\mu^-)^l,$$
$$F_1(x;\Gamma_\mu^-)^c,$$
$$F_1(x;1+\gamma_5)^l,$$
$$F_1(x;1-\gamma_5)^l,$$

$F_{1,y}$-type: 4 traces to be taken:

$$F_1(y;\Gamma_\nu^-)^l,$$
$$F_1(y;\Gamma_\nu^-)^c,$$
$$F_1(y;1+\gamma_5)^l,$$
$$F_1(y;1-\gamma_5)^l,$$