$$C_{ledq}{}^{i1\_i2\_i3\_i4\_} \to$$

$$\frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} + \hbar \Big(\frac{1}{72} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \Big(\overline{y_d}^{i4i3} \Big(27 \overline{y_e}^{pr} y_e^{pi2} y_e^{i1r} \left(1 + s_{\gamma}^{2}\right) + 4 y_e^{i1i2} \Big(13 g_1^{2} +$$

$$27 g_2^{2} + 12 g_3^{2} - 9 c_{\gamma}^{2} \left(3 \overline{y_d}^{pr} y_d^{pr} + \overline{y_e}^{pr} y_e^{pr}\right) \Big) \Big) +$$

$$9 y_e^{i1i2} \left(3 \overline{y_d}^{ri3} \overline{y_d}^{i4p} y_d^{rp} \left(1 + s_{\gamma}^{2}\right) - \overline{y_d}^{pi3} \overline{y_u}^{i4r} y_u^{pr} \left(-1 + c_{\gamma}^{2}\right)\right) \Big) +$$

$$\frac{1}{2} \sum_p s_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(2 s_{2\gamma} c_{\gamma} + s_{\gamma} c_{2\gamma}\right) LF_{1,0}[m_{\tilde{d}}^{p}] +$$

$$3 s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{pr} \overline{y_d}^{i4i3} y_d^{pr} y_e^{i1i2} \left(-s_{2\gamma} c_{\gamma} + s_{\gamma}^{3}\right) LF_{1,0}[m_{\tilde{d}}^{r}] +$$

$$\frac{1}{2} \sum_p s_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(2 s_{2\gamma} c_{\gamma} + s_{\gamma} c_{2\gamma}\right) LF_{1,0}[m_{\tilde{e}}^{p}] +$$

$$s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} \overline{y_e}^{pr} y_e^{pr} y_e^{i1i2} \left(-s_{2\gamma} c_{\gamma} + s_{\gamma}^{3}\right) LF_{1,0}[m_{\tilde{e}}^{r}] +$$

$$\frac{1}{2} s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(2 \overline{y_e}^{pr} y_e^{pr} \left(-s_{2\gamma} c_{\gamma} + s_{\gamma}^{3}\right) - \sum_p g_1^{2} \left(2 s_{2\gamma} c_{\gamma} + s_{\gamma} c_{2\gamma}\right)\right) LF_{1,0}[m_{\tilde{l}}^{p}] +$$

$$\frac{1}{2} s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2}$$

$$\left(6 \overline{y_d}^{pr} y_d^{pr} \left(-s_{2\gamma} c_{\gamma} + s_{\gamma}^{3}\right) + 6 c_{\gamma} \overline{y_u}^{pr} y_u^{pr} \left(s_{2\gamma} + s_{\gamma} c_{\gamma}\right) + \sum_p g_1^{2} \left(2 s_{2\gamma} c_{\gamma} + s_{\gamma} c_{2\gamma}\right)\right)$$

$$LF_{1,0}[m_{\tilde{q}}^{p}] - \sum_p s_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(2 s_{2\gamma} c_{\gamma} + s_{\gamma} c_{2\gamma}\right) LF_{1,0}[m_{\tilde{u}}^{p}] +$$

$$3 s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \overline{y_u}^{pr} y_u^{pr} \left(s_{2\gamma} + s_{\gamma} c_{\gamma}\right) LF_{1,0}[m_{\tilde{u}}^{r}] + \frac{1}{4} s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2}$$

$$\left(3 s_{4\gamma} c_{\gamma} \left(g_1^{2} + g_2^{2}\right) + s_{\gamma} \left(g_1^{2} \left(-1 + 3 c_{2\gamma}^{2}\right) + 3 g_2^{2} \left(-1 + c_{2\gamma}^{2}\right)\right)\right) LF_{1,0}[m_{\Phi}] +$$

$$\frac{1}{4} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \Big(\overline{y_d}^{i4i3} \left(-3 s_{\gamma}^{2} \overline{y_e}^{pr} y_e^{pi2} y_e^{i1r} + 2 y_e^{i1i2} \left(g_1^{2} + 3 g_2^{2}\right)\right) +$$

$$3 y_e^{i1i2} \left(-s_{\gamma}^{2} \overline{y_d}^{ri3} \overline{y_d}^{i4p} y_d^{rp} + c_{\gamma}^{2} \overline{y_d}^{pi3} \overline{y_u}^{i4r} y_u^{pr}\right)\Big) LF_{1,1}[m_{\Phi}] -$$

$$\frac{1}{4} s_{\gamma}^{2} y_e^{i1i2} \left(\overline{y_d}^{i4i3} \left(g_1^{2} + 3 g_2^{2}\right) + 2 c_{\gamma}^{2} \overline{y_d}^{pi3} \overline{y_u}^{i4r} y_u^{pr}\right) LF_{1,2}[m_{\Phi}] -$$

$$\frac{1}{9} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_1, m_{\tilde{d}}^{i3}] + \frac{1}{18} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_1, m_{\tilde{d}}^{i3}] -$$

$$g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_1, m_{\tilde{e}}^{i2}] + \frac{1}{2} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_1, m_{\tilde{e}}^{i2}] -$$

$$\frac{1}{4} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_1, m_{\tilde{l}}^{i1}] + \frac{1}{8} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_1, m_{\tilde{l}}^{i1}] -$$

$$\frac{1}{36} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_1, m_{\tilde{q}}^{i4}] +$$

$$\frac{1}{72} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_1, m_{\tilde{q}}^{i4}] - g_1^{2} \frac{1}{m_{\Phi}^{4}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,-1}[m_1, \tilde{\mu}] -$$

$$2 m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma}^{2} - 2 s_{\gamma}^{2}\right) LF_{1,1,0}[m_1, \tilde{\mu}] -$$

$$\frac{3}{4} g_2^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_2, m_{\tilde{l}}^{i1}] +$$

$$\frac{3}{8} g_2^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_2, m_{\tilde{l}}^{i1}] - \frac{3}{4} g_2^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_2, m_{\tilde{q}}^{i4}] +$$

$$\frac{3}{8} g_2^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_2, m_{\tilde{q}}^{i4}] - 3 g_2^{2} \frac{1}{m_{\Phi}^{4}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,-1}[m_2, \tilde{\mu}] -$$

$$6 m_2 s_{\gamma} \tilde{\mu} c_{\gamma} g_2^{2} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma}^{2} - 2 s_{\gamma}^{2}\right) LF_{1,1,0}[m_2, \tilde{\mu}] -$$

$$\frac{4}{3} g_3^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_3, m_{\tilde{d}}^{i3}] + \frac{2}{3} g_3^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_3, m_{\tilde{d}}^{i3}] -$$

$$\frac{4}{3} g_3^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,0}[m_3, m_{\tilde{q}}^{i4}] + \frac{2}{3} g_3^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,1,-1}[m_3, m_{\tilde{q}}^{i4}] -$$

$$\frac{1}{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{ri3} \overline{y_d}^{i4p} y_d^{rp} y_e^{i1i2} LF_{1,1,0}[m_{\tilde{d}}^{p}, \tilde{\mu}] + 3 s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2}$$

$$\left(s_{\gamma} \overline{a_d}^{pr} a_d^{pr} \left(-2 c_{\gamma}^{2} + s_{\gamma}^{2}\right) - \tilde{\mu} c_{\gamma} \left(c_{\gamma}^{2} - 2 s_{\gamma}^{2}\right) \left(\overline{y_d}^{pr} a_d^{pr} + y_d^{pr} \overline{a_d}^{pr}\right) + 3 s_{\gamma} \tilde{\mu}^{2} c_{\gamma}^{2} \overline{y_d}^{pr} y_d^{pr}\right)$$

$$LF_{1,1,0}[m_{\tilde{d}}^{r}, m_{\tilde{q}}^{p}] + s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2}$$

$$\left(s_{\gamma} \overline{a_e}^{pr} a_e^{pr} \left(-2 c_{\gamma}^{2} + s_{\gamma}^{2}\right) - \tilde{\mu} c_{\gamma} \left(c_{\gamma}^{2} - 2 s_{\gamma}^{2}\right) \left(\overline{y_e}^{pr} a_e^{pr} + y_e^{pr} \overline{a_e}^{pr}\right) + 3 s_{\gamma} \tilde{\mu}^{2} c_{\gamma}^{2} \overline{y_e}^{pr} y_e^{pr}\right)$$

$$LF_{1,1,0}[m_{\tilde{e}}^{r}, m_{\tilde{l}}^{p}] - \frac{1}{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} \overline{y_e}^{pr} y_e^{pi2} y_e^{i1r} LF_{1,1,0}[m_{\tilde{e}}^{r}, \tilde{\mu}] + s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3}$$

$$y_e^{i1i2} \left(\tilde{\mu} \overline{y_e}^{pr} \left(a_e^{pr} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right) - 2 s_{\gamma} \tilde{\mu} c_{\gamma} y_e^{pr}\right) + \overline{a_e}^{pr} \left(2 s_{\gamma} c_{\gamma} a_e^{pr} + \tilde{\mu} y_e^{pr} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right)\right)\right)$$

$$LF_{2,1,0}[m_{\tilde{l}}^{p}, m_{\tilde{e}}^{r}] + s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \Big(\tilde{\mu} \overline{y_e}^{pr} \left(a_e^{pr} \left(-c_{\gamma}^{2} + s_{\gamma}^{2}\right) + 2 s_{\gamma} \tilde{\mu} c_{\gamma} y_e^{pr}\right) +$$

$$\overline{a_e}^{pr} \left(-2 s_{\gamma} c_{\gamma} a_e^{pr} + \tilde{\mu} y_e^{pr} \left(-c_{\gamma}^{2} + s_{\gamma}^{2}\right)\right)\Big)\Big) LF_{3,1,-1}[m_{\tilde{l}}^{p}, m_{\tilde{e}}^{r}] +$$

$$c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} \overline{a_e}^{pr} - s_{\gamma} \tilde{\mu} \overline{y_e}^{pr}\right) \left(c_{\gamma} a_e^{pr} - s_{\gamma} \tilde{\mu} y_e^{pr}\right) LF_{3,1,0}[m_{\tilde{l}}^{p}, m_{\tilde{e}}^{r}] -$$

$$3 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} \overline{a_e}^{pr} - s_{\gamma} \tilde{\mu} \overline{y_e}^{pr}\right) \left(c_{\gamma} a_e^{pr} - s_{\gamma} \tilde{\mu} y_e^{pr}\right) LF_{4,1,-1}[m_{\tilde{l}}^{p}, m_{\tilde{e}}^{r}] +$$

$$2 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} \overline{a_e}^{pr} - s_{\gamma} \tilde{\mu} \overline{y_e}^{pr}\right) \left(c_{\gamma} a_e^{pr} - s_{\gamma} \tilde{\mu} y_e^{pr}\right) LF_{5,1,-2}[m_{\tilde{l}}^{p}, m_{\tilde{e}}^{r}] -$$

$$\frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} \overline{y_e}^{pr} y_e^{pi2} y_e^{i1r} LF_{1,1,0}[m_{\tilde{l}}^{p}, \tilde{\mu}] + 3 s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2}$$

$$\left(\tilde{\mu} \overline{y_d}^{pr} \left(a_d^{pr} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right) - 2 s_{\gamma} \tilde{\mu} c_{\gamma} y_d^{pr}\right) + \overline{a_d}^{pr} \left(2 s_{\gamma} c_{\gamma} a_d^{pr} + \tilde{\mu} y_d^{pr} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right)\right)\right)$$

$$LF_{2,1,0}[m_{\tilde{q}}^{p}, m_{\tilde{d}}^{r}] + 3 s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \Big(\tilde{\mu} \overline{y_d}^{pr} \left(a_d^{pr} \left(-c_{\gamma}^{2} + s_{\gamma}^{2}\right) + 2 s_{\gamma} \tilde{\mu} c_{\gamma} y_d^{pr}\right) +$$

$$\overline{a_d}^{pr} \left(-2 s_{\gamma} c_{\gamma} a_d^{pr} + \tilde{\mu} y_d^{pr} \left(-c_{\gamma}^{2} + s_{\gamma}^{2}\right)\right)\Big)\Big) LF_{3,1,-1}[m_{\tilde{q}}^{p}, m_{\tilde{d}}^{r}] +$$

$$3 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{pr} - s_{\gamma} \tilde{\mu} \overline{y_d}^{pr}\right) \left(c_{\gamma} a_d^{pr} - s_{\gamma} \tilde{\mu} y_d^{pr}\right) LF_{3,1,0}[m_{\tilde{q}}^{p}, m_{\tilde{d}}^{r}] -$$

$$9 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{pr} - s_{\gamma} \tilde{\mu} \overline{y_d}^{pr}\right) \left(c_{\gamma} a_d^{pr} - s_{\gamma} \tilde{\mu} y_d^{pr}\right) LF_{4,1,-1}[m_{\tilde{q}}^{p}, m_{\tilde{d}}^{r}] + 6 c_{\gamma}^{2} \overline{y_d}^{i4i3}$$

$$y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{pr} - s_{\gamma} \tilde{\mu} \overline{y_d}^{pr}\right) \left(c_{\gamma} a_d^{pr} - s_{\gamma} \tilde{\mu} y_d^{pr}\right) LF_{5,1,-2}[m_{\tilde{q}}^{p}, m_{\tilde{d}}^{r}] + 3 s_{\gamma} \frac{1}{m_{\Phi}^{4}} \overline{y_d}^{i4i3} y_e^{i1i2}$$

$$\left(3 s_{\gamma} c_{\gamma}^{2} \overline{a_u}^{pr} a_u^{pr} - \tilde{\mu} c_{\gamma} \left(c_{\gamma}^{2} - 2 s_{\gamma}^{2}\right) \left(\overline{y_u}^{pr} a_u^{pr} + y_u^{pr} \overline{a_u}^{pr}\right) + s_{\gamma} \tilde{\mu}^{2} \overline{y_u}^{pr} y_u^{pr} \left(-2 c_{\gamma}^{2} + s_{\gamma}^{2}\right)\right)$$

$$LF_{1,1,0}[m_{\tilde{q}}^{p}, m_{\tilde{u}}^{r}] - \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{ri3} \overline{y_d}^{i4p} y_d^{rp} y_e^{i1i2} LF_{1,1,0}[m_{\tilde{q}}^{r}, \tilde{\mu}] + 3 s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3}$$

$$y_e^{i1i2} \left(\tilde{\mu} \overline{y_u}^{pr} \left(a_u^{pr} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right) + 2 s_{\gamma} \tilde{\mu} c_{\gamma} y_u^{pr}\right) + \overline{a_u}^{pr} \left(-2 s_{\gamma} c_{\gamma} a_u^{pr} + \tilde{\mu} y_u^{pr} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right)\right)\right)$$

$$LF_{2,1,0}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}] + 3 s_{\gamma} c_{\gamma} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \Big(\tilde{\mu} \overline{y_u}^{pr} \left(a_u^{pr} \left(-c_{\gamma}^{2} + s_{\gamma}^{2}\right) - 2 s_{\gamma} \tilde{\mu} c_{\gamma} y_u^{pr}\right) +$$

$$\overline{a_u}^{pr} \left(2 s_{\gamma} c_{\gamma} a_u^{pr} + \tilde{\mu} y_u^{pr} \left(-c_{\gamma}^{2} + s_{\gamma}^{2}\right)\right)\Big)\Big) LF_{3,1,-1}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}] +$$

$$3 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(-s_{\gamma} \overline{a_u}^{pr} + \tilde{\mu} c_{\gamma} \overline{y_u}^{pr}\right) \left(-s_{\gamma} a_u^{pr} + \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{3,1,0}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}] -$$

$$9 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(-s_{\gamma} \overline{a_u}^{pr} + \tilde{\mu} c_{\gamma} \overline{y_u}^{pr}\right) \left(-s_{\gamma} a_u^{pr} + \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{4,1,-1}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}] +$$

$$6 c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} \left(-s_{\gamma} \overline{a_u}^{pr} + \tilde{\mu} c_{\gamma} \overline{y_u}^{pr}\right) \left(-s_{\gamma} a_u^{pr} + \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{5,1,-2}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}] -$$

$$\frac{1}{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} y_u^{pr} LF_{1,1,0}[m_{\tilde{u}}^{r}, \tilde{\mu}] +$$

$$2 m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right) LF_{2,1,0}[\tilde{\mu}, m_1] -$$

$$2 c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} m_{\Phi}^{2} + m_1 s_{\gamma} \tilde{\mu} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right)\right) LF_{3,1,-1}[\tilde{\mu}, m_1] -$$

$$2 m_1 s_{\gamma} \tilde{\mu} g_1^{2} c_{\gamma}^{3} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{3,1,0}[\tilde{\mu}, m_1] + 4 g_1^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{4,1,-2}[\tilde{\mu}, m_1] +$$

$$6 m_1 s_{\gamma} \tilde{\mu} g_1^{2} c_{\gamma}^{3} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{4,1,-1}[\tilde{\mu}, m_1] -$$

$$2 g_1^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{5,1,-3}[\tilde{\mu}, m_1] - 4 m_1 s_{\gamma} \tilde{\mu} g_1^{2} c_{\gamma}^{3} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{5,1,-2}[\tilde{\mu}, m_1] +$$

$$6 m_2 s_{\gamma} \tilde{\mu} c_{\gamma} g_2^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right) LF_{2,1,0}[\tilde{\mu}, m_2] -$$

$$6 c_{\gamma} g_2^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} \left(c_{\gamma} m_{\Phi}^{2} + m_2 s_{\gamma} \tilde{\mu} \left(c_{\gamma}^{2} - s_{\gamma}^{2}\right)\right) LF_{3,1,-1}[\tilde{\mu}, m_2] -$$

$$6 m_2 s_{\gamma} \tilde{\mu} g_2^{2} c_{\gamma}^{3} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{3,1,0}[\tilde{\mu}, m_2] + 12 g_2^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{4,1,-2}[\tilde{\mu}, m_2] +$$

$$18 m_2 s_{\gamma} \tilde{\mu} g_2^{2} c_{\gamma}^{3} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{4,1,-1}[\tilde{\mu}, m_2] -$$

$$6 g_2^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{5,1,-3}[\tilde{\mu}, m_2] - 12 m_2 s_{\gamma} \tilde{\mu} g_2^{2} c_{\gamma}^{3} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{5,1,-2}[\tilde{\mu}, m_2] +$$

$$\frac{1}{4} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{ri3} \overline{y_d}^{i4p} y_d^{rp} y_e^{i1i2} LF_{2,1,-1}[\tilde{\mu}, m_{\tilde{d}}^{p}] +$$

$$\frac{1}{4} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} \overline{y_e}^{pr} y_e^{pi2} y_e^{i1r} LF_{2,1,-1}[\tilde{\mu}, m_{\tilde{e}}^{r}] +$$

$$\frac{1}{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} \overline{y_e}^{pr} y_e^{pi2} y_e^{i1r} LF_{2,1,-1}[\tilde{\mu}, m_{\tilde{l}}^{p}] +$$

$$\frac{1}{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{ri3} \overline{y_d}^{i4p} y_d^{rp} y_e^{i1i2} LF_{2,1,-1}[\tilde{\mu}, m_{\tilde{q}}^{r}] +$$

$$\frac{1}{4} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} y_u^{pr} LF_{2,1,-1}[\tilde{\mu}, m_{\tilde{u}}^{r}] -$$

$$\frac{1}{9} m_1 s_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} y_e^{i1i2} \left(s_{\gamma} \overline{a_d}^{i4i3} + \tilde{\mu} c_{\gamma} \overline{y_d}^{i4i3}\right) LF_{1,1,1,0}[m_1, m_{\tilde{d}}^{i3}, m_{\tilde{q}}^{i4}] +$$

$$\frac{1}{36} m_1 c_{\gamma} g_1^{2} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{i4i3} - s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,2,1,-1}[m_1, m_{\tilde{d}}^{i3}, m_{\tilde{q}}^{i4}] +$$

$$\frac{1}{3} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,-1}[m_1, m_{\tilde{d}}^{i3}, \tilde{\mu}] -$$

$$\frac{1}{3} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,0}[m_1, m_{\tilde{d}}^{i3}, \tilde{\mu}] +$$

$$m_1 s_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} \left(s_{\gamma} a_e^{i1i2} + \tilde{\mu} c_{\gamma} y_e^{i1i2}\right) LF_{1,1,1,0}[m_1, m_{\tilde{e}}^{i2}, m_{\tilde{l}}^{i1}] +$$

$$\frac{1}{4} m_1 c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} \left(-c_{\gamma} a_e^{i1i2} + s_{\gamma} \tilde{\mu} y_e^{i1i2}\right) LF_{2,2,1,-1}[m_1, m_{\tilde{e}}^{i2}, m_{\tilde{l}}^{i1}] +$$

$$g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,-1}[m_1, m_{\tilde{e}}^{i2}, \tilde{\mu}] -$$

$$m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,0}[m_1, m_{\tilde{e}}^{i2}, \tilde{\mu}] +$$

$$\frac{1}{4} m_1 c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} \left(-c_{\gamma} a_e^{i1i2} + s_{\gamma} \tilde{\mu} y_e^{i1i2}\right) LF_{2,2,1,-1}[m_1, m_{\tilde{l}}^{i1}, m_{\tilde{e}}^{i2}] -$$

$$\frac{1}{2} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,-1}[m_1, m_{\tilde{l}}^{i1}, \tilde{\mu}] +$$

$$\frac{1}{2} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,0}[m_1, m_{\tilde{l}}^{i1}, \tilde{\mu}] +$$

$$\frac{1}{36} m_1 c_{\gamma} g_1^{2} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{i4i3} - s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,2,1,-1}[m_1, m_{\tilde{q}}^{i4}, m_{\tilde{d}}^{i3}] +$$

$$\frac{1}{6} g_1^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,-1}[m_1, m_{\tilde{q}}^{i4}, \tilde{\mu}] -$$

$$\frac{1}{6} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,0}[m_1, m_{\tilde{q}}^{i4}, \tilde{\mu}] +$$

$$\frac{1}{6} g_1^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-2}[m_1, \tilde{\mu}, m_{\tilde{d}}^{i3}] +$$

$$\frac{1}{6} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-1}[m_1, \tilde{\mu}, m_{\tilde{d}}^{i3}] +$$

$$\frac{1}{2} g_1^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-2}[m_1, \tilde{\mu}, m_{\tilde{e}}^{i2}] +$$

$$\frac{1}{2} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-1}[m_1, \tilde{\mu}, m_{\tilde{e}}^{i2}] -$$

$$\frac{1}{4} g_1^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-2}[m_1, \tilde{\mu}, m_{\tilde{l}}^{i1}] -$$

$$\frac{1}{4} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-1}[m_1, \tilde{\mu}, m_{\tilde{l}}^{i1}] +$$

$$\frac{1}{12} g_1^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-2}[m_1, \tilde{\mu}, m_{\tilde{q}}^{i4}] +$$

$$\frac{1}{12} m_1 s_{\gamma} \tilde{\mu} c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-1}[m_1, \tilde{\mu}, m_{\tilde{q}}^{i4}] +$$

$$\frac{3}{2} g_2^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,-1}[m_2, m_{\tilde{l}}^{i1}, \tilde{\mu}] -$$

$$\frac{3}{2} m_2 s_{\gamma} \tilde{\mu} c_{\gamma} g_2^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,0}[m_2, m_{\tilde{l}}^{i1}, \tilde{\mu}] +$$

$$\frac{3}{2} g_2^{2} \frac{1}{m_{\Phi}^{2}} s_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,-1}[m_2, m_{\tilde{q}}^{i4}, \tilde{\mu}] -$$

$$\frac{3}{2} m_2 s_{\gamma} \tilde{\mu} c_{\gamma} g_2^{2} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,0}[m_2, m_{\tilde{q}}^{i4}, \tilde{\mu}] +$$

$$\frac{3}{4} g_2^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-2}[m_2, \tilde{\mu}, m_{\tilde{l}}^{i1}] +$$

$$\frac{3}{4} m_2 s_{\gamma} \tilde{\mu} c_{\gamma} g_2^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-1}[m_2, \tilde{\mu}, m_{\tilde{l}}^{i1}] +$$

$$\frac{3}{4} g_2^{2} c_{\gamma}^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-2}[m_2, \tilde{\mu}, m_{\tilde{q}}^{i4}] +$$

$$\frac{3}{4} m_2 s_{\gamma} \tilde{\mu} c_{\gamma} g_2^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{2,2,1,-1}[m_2, \tilde{\mu}, m_{\tilde{q}}^{i4}] +$$

$$\frac{8}{3} m_3 s_{\gamma} g_3^{2} \frac{1}{m_{\Phi}^{2}} y_e^{i1i2} \left(s_{\gamma} \overline{a_d}^{i4i3} + \tilde{\mu} c_{\gamma} \overline{y_d}^{i4i3}\right) LF_{1,1,1,0}[m_3, m_{\tilde{d}}^{i3}, m_{\tilde{q}}^{i4}] +$$

$$\frac{2}{3} m_3 c_{\gamma} g_3^{2} y_e^{i1i2} \left(-c_{\gamma} \overline{a_d}^{i4i3} + s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,2,1,-1}[m_3, m_{\tilde{d}}^{i3}, m_{\tilde{q}}^{i4}] +$$

$$\frac{2}{3} m_3 c_{\gamma} g_3^{2} y_e^{i1i2} \left(-c_{\gamma} \overline{a_d}^{i4i3} + s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,2,1,-1}[m_3, m_{\tilde{q}}^{i4}, m_{\tilde{d}}^{i3}] +$$

$$\frac{1}{18} m_1 c_{\gamma} g_1^{2} y_e^{i1i2} \left(-c_{\gamma} \overline{a_d}^{i4i3} + s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,1,1,0}[m_{\tilde{d}}^{i3}, m_1, m_{\tilde{q}}^{i4}] +$$

$$\frac{1}{18} m_1 c_{\gamma} g_1^{2} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{i4i3} - s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{3,1,1,-1}[m_{\tilde{d}}^{i3}, m_1, m_{\tilde{q}}^{i4}] +$$

$$\frac{4}{3} m_3 c_{\gamma} g_3^{2} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{i4i3} - s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,1,1,0}[m_{\tilde{d}}^{i3}, m_3, m_{\tilde{q}}^{i4}] +$$

$$\frac{4}{3} m_3 c_{\gamma} g_3^{2} y_e^{i1i2} \left(-c_{\gamma} \overline{a_d}^{i4i3} + s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{3,1,1,-1}[m_{\tilde{d}}^{i3}, m_3, m_{\tilde{q}}^{i4}] +$$

$$\frac{1}{2} m_1 c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} \left(c_{\gamma} a_e^{i1i2} - s_{\gamma} \tilde{\mu} y_e^{i1i2}\right) LF_{2,1,1,0}[m_{\tilde{e}}^{i2}, m_1, m_{\tilde{l}}^{i1}] +$$

$$\frac{1}{2} m_1 c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} \left(-c_{\gamma} a_e^{i1i2} + s_{\gamma} \tilde{\mu} y_e^{i1i2}\right) LF_{3,1,1,-1}[m_{\tilde{e}}^{i2}, m_1, m_{\tilde{l}}^{i1}] +$$

$$\frac{1}{2} m_1 c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} \left(c_{\gamma} a_e^{i1i2} - s_{\gamma} \tilde{\mu} y_e^{i1i2}\right) LF_{2,1,1,0}[m_{\tilde{l}}^{i1}, m_1, m_{\tilde{e}}^{i2}] +$$

$$\frac{1}{2} m_1 c_{\gamma} g_1^{2} \overline{y_d}^{i4i3} \left(-c_{\gamma} a_e^{i1i2} + s_{\gamma} \tilde{\mu} y_e^{i1i2}\right) LF_{3,1,1,-1}[m_{\tilde{l}}^{i1}, m_1, m_{\tilde{e}}^{i2}] +$$

$$s_{\gamma} \tilde{\mu} \frac{1}{m_{\Phi}^{2}} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(c_{\gamma} a_u^{pr} + s_{\gamma} \tilde{\mu} y_u^{pr}\right) LF_{1,1,1,0}[m_{\tilde{q}}^{p}, m_{\tilde{u}}^{r}, \tilde{\mu}] +$$

$$\frac{1}{2} \tilde{\mu} c_{\gamma} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(-s_{\gamma} a_u^{pr} + \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{2,1,1,0}[m_{\tilde{q}}^{p}, m_{\tilde{u}}^{r}, \tilde{\mu}] +$$

$$\frac{1}{2} \tilde{\mu} c_{\gamma} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(s_{\gamma} a_u^{pr} - \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{3,1,1,-1}[m_{\tilde{q}}^{p}, m_{\tilde{u}}^{r}, \tilde{\mu}] +$$

$$\frac{1}{4} \tilde{\mu} c_{\gamma} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(s_{\gamma} a_u^{pr} - \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{2,2,1,-1}[m_{\tilde{q}}^{p}, \tilde{\mu}, m_{\tilde{u}}^{r}] +$$

$$\frac{1}{18} m_1 c_{\gamma} g_1^{2} y_e^{i1i2} \left(-c_{\gamma} \overline{a_d}^{i4i3} + s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,1,1,0}[m_{\tilde{q}}^{i4}, m_1, m_{\tilde{d}}^{i3}] +$$

$$\frac{1}{18} m_1 c_{\gamma} g_1^{2} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{i4i3} - s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{3,1,1,-1}[m_{\tilde{q}}^{i4}, m_1, m_{\tilde{d}}^{i3}] +$$

$$\frac{4}{3} m_3 c_{\gamma} g_3^{2} y_e^{i1i2} \left(c_{\gamma} \overline{a_d}^{i4i3} - s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{2,1,1,0}[m_{\tilde{q}}^{i4}, m_3, m_{\tilde{d}}^{i3}] +$$

$$\frac{4}{3} m_3 c_{\gamma} g_3^{2} y_e^{i1i2} \left(-c_{\gamma} \overline{a_d}^{i4i3} + s_{\gamma} \tilde{\mu} \overline{y_d}^{i4i3}\right) LF_{3,1,1,-1}[m_{\tilde{q}}^{i4}, m_3, m_{\tilde{d}}^{i3}] +$$

$$\frac{1}{2} \tilde{\mu} c_{\gamma} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(-s_{\gamma} a_u^{pr} + \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{2,1,1,0}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}, \tilde{\mu}] +$$

$$\frac{1}{2} \tilde{\mu} c_{\gamma} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(s_{\gamma} a_u^{pr} - \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{3,1,1,-1}[m_{\tilde{u}}^{r}, m_{\tilde{q}}^{p}, \tilde{\mu}] +$$

$$\frac{1}{4} \tilde{\mu} c_{\gamma} \overline{y_d}^{pi3} y_e^{i1i2} \overline{y_u}^{i4r} \left(s_{\gamma} a_u^{pr} - \tilde{\mu} c_{\gamma} y_u^{pr}\right) LF_{2,2,1,-1}[m_{\tilde{u}}^{r}, \tilde{\mu}, m_{\tilde{q}}^{p}] -$$

$$\frac{1}{3} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,1,-1}[m_1, m_{\tilde{d}}^{i3}, m_{\tilde{e}}^{i2}, \tilde{\mu}] +$$

$$\frac{1}{6} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,1,-1}[m_1, m_{\tilde{d}}^{i3}, m_{\tilde{l}}^{i1}, \tilde{\mu}] -$$

$$\frac{1}{6} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,1,-1}[m_1, m_{\tilde{e}}^{i2}, m_{\tilde{q}}^{i4}, \tilde{\mu}] +$$

$$\frac{1}{12} g_1^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,1,-1}[m_1, m_{\tilde{l}}^{i1}, m_{\tilde{q}}^{i4}, \tilde{\mu}] -$$

$$\frac{3}{4} g_2^{2} \overline{y_d}^{i4i3} y_e^{i1i2} LF_{1,1,1,1,-1}[m_2, m_{\tilde{l}}^{i1}, m_{\tilde{q}}^{i4}, \tilde{\mu}]\Big)$$