

$$\begin{aligned}
& c_\gamma y_d^{11i2} + \hbar \left( \frac{1}{144} c_\gamma \frac{1}{m_\Phi^2} (m_\Phi^2 y_d^{11i2} (96 g_3^2 + 27 g_2^2 (1 + 2 c_\gamma^2 + 2 s_\gamma^2) + g_1^2 (5 + 18 c_\gamma^2 + 18 s_\gamma^2)) + \right. \\
& \quad 54 \overline{y_d}^{pr} (m_\Phi^2 y_d^{pi2} y_d^{11r} (1 + s_\gamma^2) - 4 C_{H^2} s_\gamma^2 y_d^{pr} y_d^{11i2}) + 18 y_d^{pi2} \overline{y_u}^{pr} y_u^{11r} \\
& \quad (m_\Phi^2 (1 + c_\gamma^2) - 2 C_{H^2} s_\gamma^2)) + \frac{1}{2} \sum_p s_{2\gamma} s_\gamma g_1^2 \frac{1}{m_\Phi^4} y_d^{11i2} (C_{H^2} - m_\Phi^2) LF_{1,0}[m_d^{-p}] + \\
& \quad \frac{3}{2} s_{2\gamma} s_\gamma \frac{1}{m_\Phi^4} \overline{y_d}^{pr} y_d^{pr} y_d^{11i2} (-C_{H^2} + m_\Phi^2) LF_{1,0}[m_d^{-r}] + \frac{1}{2} \sum_p s_{2\gamma} s_\gamma g_1^2 \frac{1}{m_\Phi^4} y_d^{11i2} \\
& \quad (C_{H^2} - m_\Phi^2) LF_{1,0}[m_e^{-p}] + \frac{1}{2} s_{2\gamma} s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} \overline{y_e}^{pr} y_e^{pr} (-C_{H^2} + m_\Phi^2) LF_{1,0}[m_e^{-r}] + \\
& \quad \frac{1}{2} s_{2\gamma} s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} (-C_{H^2} + m_\Phi^2) (\overline{y_e}^{pr} y_e^{pr} + \sum_p g_1^2) LF_{1,0}[m_l^{-p}] - \\
& \quad \frac{1}{2} s_{2\gamma} s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} (-C_{H^2} + m_\Phi^2) (-3 \overline{y_d}^{pr} y_d^{pr} + 3 \overline{y_u}^{pr} y_u^{pr} + \sum_p g_1^2) LF_{1,0}[m_q^{-p}] + \\
& \quad \sum_p s_{2\gamma} s_\gamma g_1^2 \frac{1}{m_\Phi^4} y_d^{11i2} (-C_{H^2} + m_\Phi^2) LF_{1,0}[m_u^{-p}] + \\
& \quad \frac{3}{2} s_{2\gamma} s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} \overline{y_u}^{pr} y_u^{pr} (C_{H^2} - m_\Phi^2) LF_{1,0}[m_u^{-r}] + \\
& \quad \frac{3}{8} s_{4\gamma} s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} (g_1^2 + g_2^2) (C_{H^2} - m_\Phi^2) LF_{1,0}[m_\Phi] - \\
& \quad \frac{1}{4} c_\gamma y_d^{pi2} (3 s_\gamma^2 \overline{y_d}^{pr} y_d^{11r} + \overline{y_u}^{pr} y_u^{11r} (c_\gamma^2 + 4 s_\gamma^2)) LF_{1,1}[m_\Phi] - \\
& \quad \frac{1}{2} C_{H^2} c_\gamma s_\gamma^2 y_d^{pi2} \overline{y_u}^{pr} y_u^{11r} LF_{1,2}[m_\Phi] - \\
& \quad \frac{1}{9} c_\gamma g_1^2 y_d^{11i2} LF_{1,1,0}[m_1, m_d^{i2}] + \frac{1}{18} c_\gamma g_1^2 y_d^{11i2} LF_{2,1,-1}[m_1, m_d^{i2}] - \\
& \quad \frac{1}{36} c_\gamma g_1^2 y_d^{11i2} LF_{1,1,0}[m_1, m_q^{i1}] + \frac{1}{72} c_\gamma g_1^2 y_d^{11i2} LF_{2,1,-1}[m_1, m_q^{i1}] + \\
& \quad m_1 s_\gamma \tilde{\mu} g_1^2 \frac{1}{m_\Phi^4} y_d^{11i2} (C_{H^2} - m_\Phi^2) (-c_\gamma^2 + s_\gamma^2) LF_{1,1,0}[m_1, \tilde{\mu}] - \\
& \quad \frac{3}{4} c_\gamma g_2^2 y_d^{11i2} LF_{1,1,0}[m_2, m_q^{i1}] + \frac{3}{8} c_\gamma g_2^2 y_d^{11i2} LF_{2,1,-1}[m_2, m_q^{i1}] + \\
& \quad 3 m_2 s_\gamma \tilde{\mu} g_2^2 \frac{1}{m_\Phi^4} y_d^{11i2} (C_{H^2} - m_\Phi^2) (-c_\gamma^2 + s_\gamma^2) LF_{1,1,0}[m_2, \tilde{\mu}] - \\
& \quad \frac{4}{3} c_\gamma g_3^2 y_d^{11i2} LF_{1,1,0}[m_3, m_d^{i2}] + \frac{2}{3} c_\gamma g_3^2 y_d^{11i2} LF_{2,1,-1}[m_3, m_d^{i2}] - \\
& \quad \frac{4}{3} c_\gamma g_3^2 y_d^{11i2} LF_{1,1,0}[m_3, m_q^{i1}] + \frac{2}{3} c_\gamma g_3^2 y_d^{11i2} LF_{2,1,-1}[m_3, m_q^{i1}] + \\
& \quad 3 s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} (C_{H^2} - m_\Phi^2) (s_\gamma \overline{a_d}^{pr} + \tilde{\mu} c_\gamma \overline{y_d}^{pr}) (-c_\gamma a_d^{pr} + s_\gamma \tilde{\mu} y_d^{pr}) LF_{1,1,0}[m_d^{-r}, m_q^{-p}] - \\
& \quad \frac{1}{2} c_\gamma \overline{y_d}^{pr} y_d^{pi2} y_d^{11r} LF_{1,1,0}[m_d^{-r}, \tilde{\mu}] + \\
& \quad s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} (C_{H^2} - m_\Phi^2) (s_\gamma \overline{a_e}^{pr} + \tilde{\mu} c_\gamma \overline{y_e}^{pr}) (-c_\gamma a_e^{pr} + s_\gamma \tilde{\mu} y_e^{pr}) LF_{1,1,0}[m_e^{-r}, m_l^{-p}] + \\
& \quad \frac{1}{2} \frac{1}{m_\Phi^2} y_d^{11i2} (\overline{a_e}^{pr} (m_\Phi^2 c_\gamma^2 + 2 C_{H^2} s_\gamma^2) + s_\gamma \tilde{\mu} c_\gamma \overline{y_e}^{pr} (2 C_{H^2} - m_\Phi^2)) \\
& \quad (c_\gamma a_e^{pr} - s_\gamma \tilde{\mu} y_e^{pr}) LF_{2,1,0}[m_l^{-p}, m_e^{-r}] - \frac{1}{2} \frac{1}{m_\Phi^2} y_d^{11i2} \\
& \quad (\overline{a_e}^{pr} (m_\Phi^2 c_\gamma^2 + 2 C_{H^2} s_\gamma^2) + s_\gamma \tilde{\mu} c_\gamma \overline{y_e}^{pr} (2 C_{H^2} - m_\Phi^2)) (c_\gamma a_e^{pr} - s_\gamma \tilde{\mu} y_e^{pr}) LF_{3,1,-1}[m_l^{-p}, m_e^{-r}] + \\
& \quad C_{H^2} c_\gamma y_d^{11i2} (c_\gamma \overline{a_e}^{pr} - s_\gamma \tilde{\mu} \overline{y_e}^{pr}) (c_\gamma a_e^{pr} - s_\gamma \tilde{\mu} y_e^{pr}) LF_{3,1,0}[m_l^{-p}, m_e^{-r}] - \\
& \quad 3 C_{H^2} c_\gamma y_d^{11i2} (c_\gamma \overline{a_e}^{pr} - s_\gamma \tilde{\mu} \overline{y_e}^{pr}) (c_\gamma a_e^{pr} - s_\gamma \tilde{\mu} y_e^{pr}) LF_{4,1,-1}[m_l^{-p}, m_e^{-r}] + \\
& \quad 2 C_{H^2} c_\gamma y_d^{11i2} (c_\gamma \overline{a_e}^{pr} - s_\gamma \tilde{\mu} \overline{y_e}^{pr}) (c_\gamma a_e^{pr} - s_\gamma \tilde{\mu} y_e^{pr}) LF_{5,1,-2}[m_l^{-p}, m_e^{-r}] + \\
& \quad \frac{3}{2} \frac{1}{m_\Phi^2} y_d^{11i2} (\overline{a_d}^{pr} (m_\Phi^2 c_\gamma^2 + 2 C_{H^2} s_\gamma^2) + s_\gamma \tilde{\mu} c_\gamma \overline{y_d}^{pr} (2 C_{H^2} - m_\Phi^2)) \\
& \quad (c_\gamma a_d^{pr} - s_\gamma \tilde{\mu} y_d^{pr}) LF_{2,1,0}[m_q^{-p}, m_d^{-r}] - \frac{3}{2} \frac{1}{m_\Phi^2} y_d^{11i2} \\
& \quad (\overline{a_d}^{pr} (m_\Phi^2 c_\gamma^2 + 2 C_{H^2} s_\gamma^2) + s_\gamma \tilde{\mu} c_\gamma \overline{y_d}^{pr} (2 C_{H^2} - m_\Phi^2)) (c_\gamma a_d^{pr} - s_\gamma \tilde{\mu} y_d^{pr}) LF_{3,1,-1}[m_q^{-p}, m_d^{-r}] + \\
& \quad 3 C_{H^2} c_\gamma y_d^{11i2} (c_\gamma \overline{a_d}^{pr} - s_\gamma \tilde{\mu} \overline{y_d}^{pr}) (c_\gamma a_d^{pr} - s_\gamma \tilde{\mu} y_d^{pr}) LF_{3,1,0}[m_q^{-p}, m_d^{-r}] - \\
& \quad 9 C_{H^2} c_\gamma y_d^{11i2} (c_\gamma \overline{a_d}^{pr} - s_\gamma \tilde{\mu} \overline{y_d}^{pr}) (c_\gamma a_d^{pr} - s_\gamma \tilde{\mu} y_d^{pr}) LF_{4,1,-1}[m_q^{-p}, m_d^{-r}] + \\
& \quad 6 C_{H^2} c_\gamma y_d^{11i2} (c_\gamma \overline{a_d}^{pr} - s_\gamma \tilde{\mu} \overline{y_d}^{pr}) (c_\gamma a_d^{pr} - s_\gamma \tilde{\mu} y_d^{pr}) LF_{5,1,-2}[m_q^{-p}, m_d^{-r}] + \\
& \quad 3 s_\gamma \frac{1}{m_\Phi^4} y_d^{11i2} (C_{H^2} - m_\Phi^2) (s_\gamma \overline{a_u}^{pr} - \tilde{\mu} c_\gamma \overline{y_u}^{pr}) (c_\gamma a_u^{pr} + s_\gamma \tilde{\mu} y_u^{pr}) LF_{1,1,0}[m_q^{-p}, m_u^{-r}] - \\
& \quad c_\gamma \overline{y_d}^{pr} y_d^{pi2} y_d^{11r} LF_{1,1,0}[m_q^{-p}, \tilde{\mu}] - \frac{3}{2} \frac{1}{m_\Phi^2} y_d^{11i2} (s_\gamma \overline{a_u}^{pr} - \tilde{\mu} c_\gamma \overline{y_u}^{pr}) \\
& \quad (s_\gamma c_\gamma a_u^{pr} (2 C_{H^2} - m_\Phi^2) + \tilde{\mu} y_u^{pr} (m_\Phi^2 c_\gamma^2 + 2 C_{H^2} s_\gamma^2)) LF_{2,1,0}[m_u^{-r}, m_q^{-p}] + \frac{3}{2} \frac{1}{m_\Phi^2} y_d^{11i2} \\
& \quad (s_\gamma \overline{a_u}^{pr} - \tilde{\mu} c_\gamma \overline{y_u}^{pr}) (s_\gamma c_\gamma a_u^{pr} (2 C_{H^2} - m_\Phi^2) + \tilde{\mu} y_u^{pr} (m_\Phi^2 c_\gamma^2 + 2 C_{H^2} s_\gamma^2)) LF_{3,1,-1}[m_u^{-r}, m_q^{-p}] + \\
& \quad 3 C_{H^2} c_\gamma y_d^{11i2} (-s_\gamma \overline{a_u}^{pr} + \tilde{\mu} c_\gamma \overline{y_u}^{pr}) (-s_\gamma a_u^{pr} + \tilde{\mu} c_\gamma y_u^{pr}) LF_{3,1,0}[m_u^{-r}, m_q^{-p}] - \\
& \quad 9 C_{H^2} c_\gamma y_d^{11i2} (-s_\gamma \overline{a_u}^{pr} + \tilde{\mu} c_\gamma \overline{y_u}^{pr}) (-s_\gamma a_u^{pr} + \tilde{\mu} c_\gamma y_u^{pr}) LF_{4,1,-1}[m_u^{-r}, m_q^{-p}] + \\
& \quad 6 C_{H^2} c_\gamma y_d^{11i2} (-s_\gamma \overline{a_u}^{pr} + \tilde{\mu} c_\gamma \overline{y_u}^{pr}) (-s_\gamma a_u^{pr} + \tilde{\mu} c_\gamma y_u^{pr}) LF_{5,1,-2}[m_u^{-r}, m_q^{-p}] - \\
& \quad \frac$$