

$$\begin{aligned}
& c_2 \gamma^2 (g_1^2 + g_2^2) + \\
& \left( \frac{1}{16} m_1^2 (g_1^2 + g_2^2) \right) (2 m_2^2 c_2 \gamma^2 (g_1^2 + 3 g_2^2) + C_4 s_4 \gamma^2 (g_1^2 + g_2^2)) + \frac{4}{9} C_4^2 g_2^4 L F_{3,0}[m_2] + \\
& \frac{2}{3} C_4^2 g_2^4 L F_{4,-1}[m_2] - \frac{32}{45} C_4^2 g_2^4 L F_{5,-2}[m_2] + \\
& \frac{1}{4} \sum_{\mathbf{S}_2 \gamma} S_4 \gamma g_1^2 \frac{1}{m_4^2} (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) L F_{1,0}[m_0^P] - \frac{1}{12} \sum_{\mathbf{P}} g_1^2 c_2 \gamma^2 L F_{2,0}[m_0^P] + \\
& \frac{3}{4} S_2 \gamma S_4 \gamma \frac{1}{m_4} \overline{y_d^P} y_d^P (g_1^2 + g_2^2) (-C_4 \mu^2 - m_6^2) L F_{1,0}[m_d^r] + c_2 \gamma g_1^2 c_2 \gamma^2 \overline{y_d^P} y_d^P L F_{2,0}[m_d^r] + \\
& \frac{1}{4} \sum_{\mathbf{S}_2 \gamma} S_4 \gamma g_1^2 \frac{1}{m_4^2} (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) L F_{1,0}[m_0^P] - \frac{1}{4} \sum_{\mathbf{P}} g_1^4 c_2 \gamma^2 L F_{2,0}[m_0^P] + \\
& \frac{1}{4} S_2 \gamma S_4 \gamma \frac{1}{m_4} \overline{y_e^P} y_e^P (g_1^2 + g_2^2) (-C_4 \mu^2 - m_6^2) L F_{1,0}[m_e^r] + c_2 \gamma g_1^2 c_2 \gamma^2 \overline{y_e^P} y_e^P L F_{2,0}[m_e^r] + \\
& \frac{1}{4} S_2 \gamma S_4 \gamma \frac{1}{m_4} (g_1^2 + g_2^2) (-C_4 \mu^2 + m_6^2) (\overline{y_e^P} y_e^P + \sum_{\mathbf{P}} g_1^2) L F_{1,0}[m_l^P] - \\
& \frac{1}{8} c_2 \gamma (4 c_2 \gamma^2 \overline{y_e^P} y_e^P (g_1^2 - g_2^2) + \sum_{\mathbf{P}} c_2 \gamma (g_1^4 + g_2^4)) L F_{2,0}[m_l^P] + \\
& \frac{1}{18} C_4^2 g_2^2 (36 c_2 \gamma c_2 \gamma^2 \overline{y_e^P} y_e^P + \sum_{\mathbf{P}} g_2^2 (4 - 9 c_2 \gamma^2)) L F_{3,0}[m_l^P] + \frac{1}{12} C_4^2 g_2^2 \\
& (-24 c_2 \gamma c_2 \gamma^2 \overline{y_e^P} y_e^P + \sum_{\mathbf{P}} g_2^2 (-5 + 6 c_2 \gamma^2)) L F_{4,-1}[m_l^P] + \frac{45}{8} \sum_{\mathbf{P}} C_4^2 g_2^4 L F_{5,-2}[m_l^P] + \\
& \frac{1}{4} S_2 \gamma S_4 \gamma \frac{1}{m_4} (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) (-3 \overline{y_d^P} y_d^P + 3 \overline{y_u^P} y_u^P + \sum_{\mathbf{P}} g_1^2) L F_{1,0}[m_l^P] + \\
& \frac{1}{24} c_2 \gamma (12 c_2 \gamma^2 \overline{y_d^P} y_d^P (g_1^2 + 3 g_2^2) + 12 s_2 \gamma^2 \overline{y_u^P} y_u^P (g_1^2 - 3 g_2^2) - \sum_{\mathbf{P}} c_2 \gamma (g_1^4 + 9 g_2^4)) \\
& L F_{2,0}[m_0^P] + \frac{1}{6} C_4^2 g_2^2 (36 c_2 \gamma (c_2 \gamma^2 \overline{y_d^P} y_d^P - s_2 \gamma^2 \overline{y_u^P} y_u^P) + \sum_{\mathbf{P}} g_2^2 (-4 - 9 c_2 \gamma^2)) L F_{3,0}[m_0^P] + \\
& \frac{1}{4} C_4^2 g_2^2 (24 c_2 \gamma (-c_2 \gamma^2 \overline{y_d^P} y_d^P + s_2 \gamma^2 \overline{y_u^P} y_u^P) + \sum_{\mathbf{P}} g_2^2 (-5 + 6 c_2 \gamma^2)) L F_{4,-1}[m_0^P] + \\
& \frac{8}{15} \sum_{\mathbf{P}} C_4^2 g_2^4 L F_{5,-2}[m_0^P] + \frac{1}{2} \sum_{\mathbf{S}_2 \gamma} S_4 \gamma g_1^2 \frac{1}{m_4^2} (g_1^2 + g_2^2) (-C_4 \mu^2 + m_6^2) L F_{1,0}[m_0^P] - \\
& \frac{1}{3} \sum_{\mathbf{P}} g_1^4 c_2 \gamma^2 L F_{2,0}[m_0^P] + \frac{3}{4} S_2 \gamma S_4 \gamma \frac{1}{m_4} \overline{y_u^P} y_u^P (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) L F_{1,0}[m_u^r] - \\
& 2 c_2 \gamma g_1^2 s_2 \gamma^2 \overline{y_u^P} y_u^P L F_{2,0}[m_u^r] + \frac{3}{16} \frac{1}{m_6^4} s_4 \gamma^2 (C_4 \mu^2 - m_6^2) L F_{1,0}[m_0] (g_1^2 + g_2^2)^2 - \\
& \frac{3}{16} s_4 \gamma^2 L F_{1,1}[m_0] (g_1^2 + g_2^2)^2 + \frac{3}{16} C_4^2 s_4 \gamma^2 L F_{1,2}[m_0] (g_1^2 + g_2^2)^2 + \\
& \frac{1}{64} (2 g_1^2 g_2^2 (3 + c_4 \gamma (2 - 5 c_4 \gamma) - 4 s_2 \gamma^4) - g_2^4 (9 + c_4 \gamma (-6 + 5 c_4 \gamma) + 4 s_2 \gamma^4) - \\
& g_1^4 (1 + c_4 \gamma (2 + 5 c_4 \gamma) + 4 s_2 \gamma^4)) L F_{2,0}[m_0] + \frac{1}{288} C_4^2 (-9 g_1^4 ((-1 + c_4 \gamma)^2 + 4 s_2 \gamma^4) - \\
& 18 g_1^2 g_2^2 (-3 + c_4 \gamma (2 + c_4 \gamma) + 4 s_2 \gamma^4) - g_2^4 (17 + 9 c_4 \gamma (6 + c_4 \gamma) + 36 s_2 \gamma^4)) L F_{3,0}[m_0] + \\
& \frac{1}{96} C_4^2 (3 g_1^4 ((-1 + c_4 \gamma)^2 + 4 s_2 \gamma^4) + 6 g_1^2 g_2^2 (-3 + c_4 \gamma (2 + c_4 \gamma) + 4 s_2 \gamma^4) + \\
& g_2^4 (-13 + c_4 \gamma (6 + c_4 \gamma) + 12 s_2 \gamma^4)) L F_{4,-1}[m_0] + \\
& \frac{8}{45} C_4^2 g_2^4 L F_{5,-2}[m_0] + \frac{2}{9} C_4^2 g_2^4 L F_{3,0}[\tilde{\mu}] + \frac{1}{3} C_4^2 g_2^4 L F_{4,-1}[\tilde{\mu}] - \frac{16}{45} C_4^2 g_2^4 L F_{5,-2}[\tilde{\mu}] + \\
& \frac{1}{2} m_1 s_4 \gamma \tilde{\mu} g_1^2 \frac{1}{m_4} (g_1^2 + g_2^2) (-C_4 \mu^2 + m_6^2) (c_2^2 - s_2 \gamma^2) L F_{1,1,0}[m_1, \tilde{\mu}] + \frac{1}{2} g_1^4 L F_{2,2,-2}[m_1, \tilde{\mu}] + \\
& \frac{1}{2} g_1^4 (m_1^2 + 8 m_1 s_4 \gamma \tilde{\mu} c_2 \gamma + 4 s_2 \gamma^2 \tilde{\mu}^2 c_2 \gamma^2) L F_{2,2,-1}[m_1, \tilde{\mu}] + 2 g_1^4 m_1^2 s_2 \gamma^2 \tilde{\mu}^2 c_2 \gamma^2 L F_{2,2,0}[m_1, \tilde{\mu}] + \\
& \frac{3}{2} m_2 s_4 \gamma \tilde{\mu} g_2^2 \frac{1}{m_4} (g_1^2 + g_2^2) (-C_4 \mu^2 + m_6^2) (c_2^2 - s_2 \gamma^2) L F_{1,1,0}[m_2, \tilde{\mu}] - \frac{8}{3} C_4^2 g_2^4 L F_{2,1,0}[m_2, \tilde{\mu}] + \\
& \frac{1}{2} g_2^4 (5 c_4 \gamma + 2 s_2 \gamma^2 c_2 \gamma^2 + 5 s_4^4) L F_{2,2,-2}[m_2, \tilde{\mu}] + \frac{1}{6} g_2^4 (3 m_2^2 (c_4 \gamma + 10 s_2 \gamma^2 c_2 \gamma^2 + s_4^4) - \\
& 2 C_4^2 (9 c_4^2 + 8 s_2 \gamma^2 + 9 s_4^4 + c_2 \gamma^2 (8 - 24 s_2 \gamma^2)) + 72 m_2 s_4 \gamma \tilde{\mu} c_2 \gamma + 36 s_2 \gamma^2 \tilde{\mu}^2 c_2 \gamma^2) L F_{2,2,-1}[m_2, \tilde{\mu}] - \\
& \frac{2}{3} m_2 s_4 \gamma c_2 \gamma g_2^4 (-9 m_2 s_4 \gamma \tilde{\mu}^2 + C_4^2 (6 m_2 s_4 \gamma c_2 \gamma + 8 \tilde{\mu})) L F_{2,2,0}[m_2, \tilde{\mu}] + \\
& \frac{4}{3} C_4^2 g_2^4 L F_{3,1,-1}[m_2, \tilde{\mu}] + \frac{4}{3} C_4^2 g_2^4 (6 c_4 \gamma + s_2 \gamma^2 + 6 s_4^4 + c_2^2 (1 - 12 s_2 \gamma^2)) L F_{3,2,-2}[m_2, \tilde{\mu}] + \\
& \frac{2}{3} m_2 C_4^2 g_2^4 (-9 m_2 (c_2^2 - s_2 \gamma^2)^2 + 4 s_4 \gamma \tilde{\mu} c_2 \gamma) L F_{3,2,-1}[m_2, \tilde{\mu}] - \\
& 4 C_4^2 g_2^4 L F_{3,3,-3}[m_2, \tilde{\mu}] (c_2^2 - s_2 \gamma^2)^2 + 4 C_4^2 g_2^4 m_2^2 L F_{3,3,-2}[m_2, \tilde{\mu}] (c_2^2 - s_2 \gamma^2)^2 - \\
& 4 C_4^2 g_2^4 L F_{4,2,-2}[m_2, \tilde{\mu}] (c_2^2 - s_2 \gamma^2)^2 + 4 C_4^2 g_2^4 m_2^2 L F_{4,2,-1}[m_2, \tilde{\mu}] (c_2^2 - s_2 \gamma^2)^2 - \\
& 3 c_4 \gamma^2 \overline{y_d^P} \overline{y_d^S} y_d^P y_d^S L F_{1,1,0}[m_d^r, m_t^t] + \frac{3}{4} s_4 \gamma \frac{1}{m_4^4} (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) \\
& (\tilde{\mu} \overline{y_d^P} (a_d^P (-c_2 \gamma^2 + s_2^2) + 2 s_4 \gamma \tilde{\mu} c_2 \gamma y_d^P) + \overline{a_d^P} (-2 s_4 \gamma c_2 \gamma a_d^P + \tilde{\mu} y_d^P (-c_2 \gamma^2 + s_2^2))) \\
& L F_{1,1,0}[m_d^r, m_q^P] + c_2 \gamma g_1^2 (c_2 \gamma \overline{a_d^P} - s_2 \gamma \tilde{\mu} \overline{y_d^P}) (c_2 \gamma a_d^P - s_2 \gamma \tilde{\mu} y_d^P) L F_{2,1,0}[m_d^r, m_q^P] + \\
& C_4^2 c_2 \gamma g_1^2 (c_2 \gamma \overline{a_d^P} - s_2 \gamma \tilde{\mu} \overline{y_d^P}) (c_2 \gamma a_d^P - s_2 \gamma \tilde{\mu} y_d^P) L F_{2,2,0}[m_d^r, m_q^P] - \\
& c_4 \gamma \overline{y_e^P} \overline{y_e^S} y_e^P y_e^S L F_{1,1,0}[m_e^r, m_t^t] + \frac{1}{4} s_4 \gamma \frac{1}{m_6^4} (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) \\
& (\tilde{\mu} \overline{y_e^P} (a_e^P (-c_2 \gamma^2 + s_2^2) + 2 s_4 \gamma \tilde{\mu} c_2 \gamma y_e^P) + \overline{a_e^P} (-2 s_4 \gamma c_2 \gamma a_e^P + \tilde{\mu} y_e^P (-c_2 \gamma^2 + s_2^2))) \\
& L F_{1,1,0}[m_e^r, m_l^P] + c_2 \gamma g_1^2 (c_2 \gamma \overline{a_e^P} - s_2 \gamma \tilde{\mu} \overline{y_e^P}) (c_2 \gamma a_e^P - s_2 \gamma \tilde{\mu} y_e^P) L F_{2,1,0}[m_e^r, m_l^P] + \\
& C_4^2 c_2 \gamma g_1^2 (c_2 \gamma \overline{a_e^P} - s_2 \gamma \tilde{\mu} \overline{y_e^P}) (c_2 \gamma a_e^P - s_2 \gamma \tilde{\mu} y_e^P) L F_{2,2,0}[m_e^r, m_l^P] + \frac{1}{4} \frac{1}{m_6^4} (\tilde{\mu} \overline{y_e^P} \\
& (a_e^P (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-1 + c_2 \gamma) + g_2^2 (1 + c_2 \gamma)) + s_4 \gamma C_4^2 (g_1^2 + g_2^2) (c_2^2 - s_2 \gamma^2)) + \\
& 2 s_4 \gamma \tilde{\mu} y_e^P (-s_4 \gamma C_4^2 c_2 \gamma (g_1^2 + g_2^2) + s_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-1 + c_2 \gamma) + g_2^2 (1 + c_2 \gamma)) + \\
& \overline{a_e^P} (2 c_2 \gamma a_e^P (c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-1 + c_2 \gamma) + g_2^2 (1 + c_2 \gamma)) + s_4 \gamma s_4 C_4^2 (g_1^2 + g_2^2)) + \tilde{\mu} y_e^P \\
& (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-1 + c_2 \gamma) + g_2^2 (1 + c_2 \gamma)) + s_4 \gamma C_4^2 (g_1^2 + g_2^2) (c_2^2 - s_2 \gamma^2)))) \\
& L F_{2,1,0}[m_l^P, m_q^P] + \frac{1}{4} \frac{1}{m_6^4} (g_1^2 + g_2^2) (-2 c_2 \gamma \overline{a_e^P} a_e^P (c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma s_4 C_4^2) - \\
& \tilde{\mu} (-2 s_4 \gamma c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma C_4^2 (c_2^2 - s_2 \gamma^2)) (\overline{y_e^P} a_e^P + y_e^P \overline{a_e^P}) + \\
& 2 s_4 \gamma \tilde{\mu}^2 \overline{y_e^P} y_e^P (s_4 \gamma C_4^2 c_2 \gamma - s_2 \gamma m_6^2 c_2 \gamma^2)) L F_{3,1,-1}[m_l^P, m_e^r] + C_4^2 c_2 \gamma \\
& (g_1^2 (-1 + c_2 \gamma) + g_2^2 (1 + c_2 \gamma)) (c_2 \gamma \overline{a_e^P} - s_2 \gamma \tilde{\mu} \overline{y_e^P}) (c_2 \gamma a_e^P - s_2 \gamma \tilde{\mu} y_e^P) L F_{3,1,0}[m_l^P, m_e^r] - \\
& C_4^2 c_2 \gamma g_1^2 (c_2 \gamma \overline{a_e^P} - s_2 \gamma \tilde{\mu} \overline{y_e^P}) (c_2 \gamma a_e^P - s_2 \gamma \tilde{\mu} y_e^P) L F_{3,2,-1}[m_l^P, m_e^r] - \frac{1}{2} C_4^2 (-1 + 2 c_2 \gamma) \\
& (2 g_2^2 + 3 c_2 \gamma (g_1^2 + g_2^2)) (c_2 \gamma \overline{a_e^P} - s_2 \gamma \tilde{\mu} \overline{y_e^P}) (c_2 \gamma a_e^P - s_2 \gamma \tilde{\mu} y_e^P) L F_{4,1,-1}[m_l^P, m_e^r] + \\
& \frac{2}{3} C_4^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) (c_2 \gamma \overline{a_e^P} - s_2 \gamma \tilde{\mu} \overline{y_e^P}) (c_2 \gamma a_e^P - s_2 \gamma \tilde{\mu} y_e^P) L F_{5,1,-2}[m_l^P, m_e^r] - \\
& c_4 \gamma \overline{y_e^P} \overline{y_e^S} y_e^P y_e^S L F_{1,1,0}[m_l^P, m_l^S] - 2 C_4^2 c_4 \gamma^2 \overline{y_e^P} \overline{y_e^S} y_e^P y_e^S L F_{2,1,0}[m_l^P, m_l^S] + \\
& 2 C_4^2 c_4 \gamma^2 \overline{y_e^P} \overline{y_e^S} y_e^P y_e^S L F_{3,1,-1}[m_l^P, m_l^S] + \\
& \frac{1}{4} \frac{1}{m_6^2} (\tilde{\mu} \overline{y_d^P} (a_d^P (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (1 + 3 c_2 \gamma) + 3 g_2^2 (1 + c_2 \gamma)) + \\
& 3 s_4 \gamma C_4^2 (g_1^2 + g_2^2) (c_2^2 - s_2 \gamma^2)) + \\
& 2 s_4 \gamma \tilde{\mu} y_d^P (-3 s_4 \gamma C_4^2 c_2 \gamma (g_1^2 + g_2^2) + s_2 \gamma c_2 \gamma m_6^2 (g_1^2 (1 + 3 c_2 \gamma) + 3 g_2^2 (1 + c_2 \gamma)) + \\
& \overline{a_d^P} (2 c_2 \gamma a_d^P (c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (1 + 3 c_2 \gamma) + 3 g_2^2 (1 + c_2 \gamma)) + 3 s_4 \gamma s_4 C_4^2 (g_1^2 + g_2^2)) + \\
& \tilde{\mu} y_d^P (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (1 + 3 c_2 \gamma) + 3 g_2^2 (1 + c_2 \gamma)) + \\
& 3 s_4 \gamma C_4^2 (g_1^2 + g_2^2) (c_2^2 - s_2 \gamma^2)))) L F_{2,1,0}[m_q^P, m_d^r] + \frac{3}{4} \frac{1}{m_6^4} (g_1^2 + g_2^2) \\
& (-2 c_2 \gamma \overline{a_d^P} a_d^P (c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma s_4 C_4^2) - \tilde{\mu} (-2 s_4 \gamma c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma C_4^2 (c_2^2 - s_2 \gamma^2)) \\
& (\overline{y_d^P} a_d^P + y_d^P \overline{a_d^P}) + 2 s_4 \gamma \tilde{\mu}^2 \overline{y_d^P} y_d^P (s_4 \gamma C_4^2 c_2 \gamma - s_2 \gamma m_6^2 c_2 \gamma^2)) L F_{3,1,-1}[m_q^P, m_d^r] + \\
& C_4^2 c_2 \gamma (g_1^2 (1 + 3 c_2 \gamma) + 3 g_2^2 (1 + c_2 \gamma)) (c_2 \gamma \overline{a_d^P} - s_2 \gamma \tilde{\mu} \overline{y_d^P}) (c_2 \gamma a_d^P - s_2 \gamma \tilde{\mu} y_d^P) \\
& L F_{3,1,0}[m_q^P, m_d^r] - C_4^2 c_2 \gamma g_1^2 (c_2 \gamma \overline{a_d^P} - s_2 \gamma \tilde{\mu} \overline{y_d^P}) (c_2 \gamma a_d^P - s_2 \gamma \tilde{\mu} y_d^P) L F_{3,2,-1}[m_q^P, m_d^r] - \\
& \frac{3}{2} C_4^2 (-2 g_2^2 + c_2 \gamma (1 + 6 c_2 \gamma) (g_1^2 + g_2^2)) (c_2 \gamma \overline{a_d^P} - s_2 \gamma \tilde{\mu} \overline{y_d^P}) \\
& (c_2 \gamma a_d^P - s_2 \gamma \tilde{\mu} y_d^P) L F_{4,1,-1}[m_q^P, m_d^r] + \\
& 2 C_4^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) (c_2 \gamma \overline{a_d^P} - s_2 \gamma \tilde{\mu} \overline{y_d^P}) (c_2 \gamma a_d^P - s_2 \gamma \tilde{\mu} y_d^P) L F_{5,1,-2}[m_q^P, m_d^r] - \\
& 3 (c_4 \gamma \overline{y_d^P} \overline{y_d^S} y_d^P y_d^S + s_2 \gamma^2 \overline{y_u^P} \overline{y_u^S} y_u^P y_u^S) L F_{1,1,0}[m_q^P, m_u^r] - \\
& 6 C_4^2 (c_2^2 \overline{y_d^P} y_d^P (c_2^2 \overline{y_d^S} y_d^S - s_2^2 \overline{y_u^P} y_u^P) + s_4 \gamma \overline{y_u^P} \overline{y_u^S} y_u^P y_u^S) L F_{2,1,0}[m_q^P, m_q^S] + \\
& 6 C_4^2 (c_2^2 \overline{y_d^P} y_d^P (c_2^2 \overline{y_d^S} y_d^S - s_2^2 \overline{y_u^P} y_u^P) + s_4 \gamma \overline{y_u^P} \overline{y_u^S} y_u^P y_u^S) L F_{3,1,-1}[m_q^P, m_q^S] + \\
& \frac{3}{4} s_4 \gamma \frac{1}{m_4^4} (g_1^2 + g_2^2) (C_4 \mu^2 - m_6^2) (\tilde{\mu} \overline{y_u^P} (a_u^P (-c_2 \gamma^2 + s_2^2) - 2 s_4 \gamma \tilde{\mu} c_2 \gamma y_u^P) + \\
& \overline{a_u^P} (2 s_4 \gamma c_2 \gamma a_u^P + \tilde{\mu} y_u^P (-c_2 \gamma^2 + s_2^2))) L F_{1,1,0}[m_q^P, m_u^r] + \\
& \frac{1}{2} c_2 \gamma (g_1^2 - 3 g_2^2) (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{2,1,0}[m_q^P, m_u^r] + \\
& \frac{1}{2} C_4^2 (c_2 \gamma g_1^2 + g_2^2 (4 - 3 c_2 \gamma)) (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{2,2,0}[m_q^P, m_u^r] - \\
& 6 C_4^2 c_2 \gamma g_2^2 (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{3,1,0}[m_q^P, m_u^r] + \\
& C_4^2 g_2^2 (-1 + 3 c_2 \gamma) (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{3,2,-1}[m_q^P, m_u^r] + \\
& 6 C_4^2 c_2 \gamma g_2^2 (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{4,1,-1}[m_q^P, m_u^r] + \\
& 6 C_4^2 s_2 \gamma^2 c_2^2 \overline{y_d^P} y_d^S \overline{y_u^S} y_u^P L F_{2,1,0}[m_q^S, m_q^P] - \\
& 6 C_4^2 s_2 \gamma^2 c_2^2 \overline{y_d^P} y_d^S \overline{y_u^S} y_u^P L F_{3,1,-1}[m_q^S, m_q^P] + \frac{1}{4} \frac{1}{m_6^2} (\tilde{\mu} \overline{y_u^P} \\
& (a_u^P (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-4 + 3 c_2 \gamma) + 3 c_2 \gamma g_2^2) + 3 s_4 \gamma C_4^2 (g_1^2 + g_2^2) (c_2^2 - s_2 \gamma^2)) + \\
& 2 \tilde{\mu} c_2 \gamma y_u^P (c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-4 + 3 c_2 \gamma) + 3 c_2 \gamma g_2^2) + 3 s_4 \gamma s_4 C_4^2 (g_1^2 + g_2^2)) + \\
& \overline{a_u^P} (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-4 + 3 c_2 \gamma) + 3 c_2 \gamma g_2^2) + s_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-4 + 3 c_2 \gamma) + 3 c_2 \gamma g_2^2)) + \tilde{\mu} y_u^P \\
& (-2 s_4 \gamma c_2 \gamma c_2 \gamma m_6^2 (g_1^2 (-4 + 3 c_2 \gamma) + 3 c_2 \gamma g_2^2) + 3 s_4 \gamma C_4^2 (g_1^2 + g_2^2) (c_2^2 - s_2 \gamma^2)))) \\
& L F_{2,1,0}[m_u^r, m_q^P] + \frac{3}{4} \frac{1}{m_6^2} (g_1^2 + g_2^2) (2 s_4 \gamma \overline{a_u^P} a_u^P (s_4 \gamma C_4^2 c_2 \gamma - s_2 \gamma m_6^2 c_2 \gamma^2) + \\
& \tilde{\mu} (2 s_4 \gamma c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma C_4^2 (-c_2 \gamma^2 + s_2^2)) (\overline{y_u^P} a_u^P + y_u^P \overline{a_u^P}) - \\
& 2 c_2 \gamma \tilde{\mu}^2 \overline{y_u^P} y_u^P (c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma s_4 C_4^2)) L F_{3,1,-1}[m_u^r, m_q^P] + \\
& C_4^2 (c_2 \gamma g_1^2 (-4 + 3 c_2 \gamma) + g_2^2 (-2 + 3 c_2 \gamma^2)) (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) \\
& (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{3,1,0}[m_u^r, m_q^P] - \\
& \frac{1}{2} C_4^2 (c_2 \gamma g_1^2 + g_2^2 (4 - 3 c_2 \gamma)) (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{3,2,-1}[m_u^r, m_q^P] - \\
& 3 C_4^2 (c_2 \gamma g_1^2 (-2 + 2 c_2 \gamma) + g_2^2 (-3 + 2 c_2 \gamma^2)) \\
& (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{4,1,-1}[m_u^r, m_q^P] + \\
& 2 C_4^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) (s_4 \gamma \overline{a_u^P} - \tilde{\mu} c_2 \gamma \overline{y_u^P}) (s_4 \gamma a_u^P - \tilde{\mu} c_2 \gamma y_u^P) L F_{5,1,-2}[m_u^r, m_q^P] - \\
& 3 s_4 \gamma \overline{y_u^P} \overline{y_u^S} y_u^P y_u^S L F_{1,1,0}[m_u^r, m_u^t] - \frac{3}{4} g_1^4 c_2 \gamma^2 (g_1^2 + g_2^2) L F_{2,1,-1}[\tilde{\mu}, m_1] + \\
& \frac{1}{2} m_1 \tilde{\mu} g_1^2 \frac{1}{m_2} (g_1^2 + g_2^2) (-2 s_4 \gamma c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma C_4^2 (c_2^2 - s_2 \gamma^2)) L F_{2,1,0}[\tilde{\mu}, m_1] + \\
& \frac{1}{2} g_1^2 c_2 \gamma^2 (g_1^2 + g_2^2) L F_{3,1,-2}[\tilde{\mu}, m_1] + \frac{1}{2} g_1^2 \frac{1}{m_6^2} (g_1^2 + g_2^2) \\
& (m_1 s_4 \gamma C_4^2 \tilde{\mu} (-c_2 \gamma^2 + s_2^2) + 2 m_2^2 c_2 \gamma^2 (-2 C_4^2 + m_1 s_4 \gamma \tilde{\mu} c_2 \gamma)) L F_{3,1,-1}[\tilde{\mu}, m_1] - \\
& 2 m_1 s_4 \gamma C_4^2 \tilde{\mu} c_2 \gamma g_1^2 c_2 \gamma^2 (g_1^2 + g_2^2) L F_{3,1,0}[\tilde{\mu}, m_1] + \frac{3}{2} C_4^2 g_1^4 L F_{3,2,-2}[\tilde{\mu}, m_1] + \\
& \frac{1}{2} C_4^2 g_1^4 (3 m_1^2 + 20 m_1 s_4 \gamma \tilde{\mu} c_2 \gamma + 8 s_2 \gamma^2 \tilde{\mu}^2 c_2 \gamma^2) L F_{3,2,-1}[\tilde{\mu}, m_1] + \\
& 4 C_4^2 g_1^4 m_2^2 s_2^2 \tilde{\mu}^2 c_2^2 L F_{3,2,0}[\tilde{\mu}, m_1] + \\
& \frac{1}{3} C_4^2 g_1^2 (-5 g_2^2 + 12 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{4,1,-2}[\tilde{\mu}, m_1] + \\
& 2 m_1 s_4 \gamma \tilde{\mu} \tilde{\mu} c_2 \gamma (g_1^2 - (g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{4,1,-1}[\tilde{\mu}, m_1] - \\
& C_4^2 L F_{4,2,-3}[\tilde{\mu}, m_1] + C_4^2 g_1^4 (-m_2^2 - 8 m_1 s_4 \gamma \tilde{\mu} c_2 \gamma - 4 s_2 \gamma^2 \tilde{\mu}^2 c_2 \gamma^2) L F_{4,2,-2}[\tilde{\mu}, m_1] - \\
& 4 C_4^2 g_1^4 m_2^2 s_2^2 \tilde{\mu}^2 c_2^2 L F_{4,2,-1}[\tilde{\mu}, m_1] - \frac{2}{3} C_4^2 g_1^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{5,1,-3}[\tilde{\mu}, m_1] - \\
& \frac{4}{3} m_1 s_4 \gamma C_4^2 \tilde{\mu} c_2 \gamma g_1^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{5,1,-2}[\tilde{\mu}, m_1] - \\
& \frac{9}{4} g_2^2 c_2 \gamma^2 (g_1^2 + g_2^2) L F_{2,1,-1}[\tilde{\mu}, m_2] + \\
& \frac{3}{2} m_2 \tilde{\mu} g_2^2 \frac{1}{m_2} (g_1^2 + g_2^2) (-2 s_4 \gamma c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma C_4^2 (c_2^2 - s_2 \gamma^2)) L F_{2,1,0}[\tilde{\mu}, m_2] + \\
& \frac{3}{2} g_2^2 c_2 \gamma^2 (g_1^2 + g_2^2) L F_{3,1,-2}[\tilde{\mu}, m_2] + \frac{1}{6} g_2^2 \frac{1}{m_6^2} (-4 C_4^2 m_6^2 (-8 g_2^2 + 9 c_2 \gamma^2 (g_1^2 + g_2^2)) + \\
& 9 m_2 \tilde{\mu} (g_1^2 + g_2^2) (2 s_4 \gamma c_2 \gamma m_6^2 c_2 \gamma^2 + s_4 \gamma C_4^2 (-c_2 \gamma^2 + s_2^2))) L F_{3,1,-1}[\tilde{\mu}, m_2] - \\
& \frac{2}{3} m_2 s_4 \gamma C_4^2 \tilde{\mu} c_2 \gamma g_2^2 (-8 g_2^2 + 9 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{3,1,0}[\tilde{\mu}, m_2] + \\
& \frac{1}{6} C_4^2 g_2^4 (69 c_4^2 + 16 s_2 \gamma^2 + 69 s_4^4 + c_2^2 (16 - 6 s_2 \gamma^2)) L F_{3,2,-2}[\tilde{\mu}, m_2] + \\
& \frac{1}{6} C_4^2 g_2^4 (3 m_2^2 (3 c_4^2 + 38 s_2 \gamma^2 c_2^2 + 3 s_4^4) + 4 m_2 s_4 \gamma \tilde{\mu} c_2 \gamma (8 + 51 c_2 \gamma^2 + 51 s_2 \gamma^2) + 72 s_2 \gamma^2 \tilde{\mu}^2 c_2^2 \gamma^2) \\
& L F_{3,2,-1}[\tilde{\mu}, m_2] + 12 C_4^2 g_2^4 m_2^2 s_2^2 \tilde{\mu}^2 c_2^2 L F_{3,2,0}[\tilde{\mu}, m_2] + \\
& 3 C_4^2 g_2^2 (-3 g_2^2 + 4 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{4,1,-2}[\tilde{\mu}, m_2] + \\
& 2 m_2 s_4 \gamma C_4^2 \tilde{\mu} c_2 \gamma g_2^2 (-7 g_2^2 + 9 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{4,1,-1}[\tilde{\mu}, m_2] - \\
& C_4^2 g_2^4 (7 c_4^2 + 2 s_2 \gamma^2 c_2^2 + 7 s_4^4) L F_{4,2,-3}[\tilde{\mu}, m_2] - \\
& C_4^2 g_2^4 (m_2^2 (c_4^2 + 14 s_2 \gamma^2 c_2^2 + s_4^4) + 32 m_2 s_4 \gamma \tilde{\mu} c_2 \gamma + 16 s_2 \gamma^2 \tilde{\mu}^2 c_2^2 \gamma^2) L F_{4,2,-2}[\tilde{\mu}, m_2] - \\
& 16 C_4^2 g_2^4 m_2^2 s_2^2 \tilde{\mu}^2 c_2^2 L F_{4,2,-1}[\tilde{\mu}, m_2] - 2 C_4^2 g_2^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{5,1,-3}[\tilde{\mu}, m_2] - \\
& 4 m_2 s_4 \gamma C_4^2 \tilde{\mu} c_2 \gamma g_2^2 (-2 g_2^2 + 3 c_2 \gamma^2 (g_1^2 + g_2^2)) L F_{5,1,-2}[\tilde{\mu}, m_2] + \\
& 8 C_4^2 g_1^2 g_2^2$$