

$$\begin{aligned} & \hbar \left(-\frac{1}{144} \frac{1}{m_e^2} s_\gamma^2 (36 \overline{y_e^{-i2i3}} y_e^{i1i4} (8 g_1^2 + 3 g_2^2) + 9 \overline{y_e^{pr}} \overline{y_e^{-i2i3}} (3 y_e^{pi4} y_e^{i1r} (1 + s_\gamma^2) - \right. \\ & \quad 8 c_\gamma y_e^{pr} y_e^{i1i4}) + 27 \overline{y_e^{ri3}} \overline{y_e^{-i2p}} (4 c_\gamma y_e^{ri4} y_e^{i1p} + y_e^{rp} y_e^{i1i4} (1 + s_\gamma^2)) + \\ & \quad 2 g_1^2 (5 \overline{y_e^{pi3}} y_e^{pi4} \delta_{i1i2} + 7 \overline{y_e^{-i2p}} y_e^{i1p} \delta_{i3i4})) - \frac{1}{4} \sum_p s_\gamma g_1^2 \frac{1}{m_e^4} \overline{y_e^{-i2i3}} \\ & \quad y_e^{i1i4} (2 s_{2\gamma} c_\gamma + s_\gamma c_{2\gamma}) LF_{1,0}[m_d^p] + \frac{2}{27} \sum_p g_1^4 LF_{3,0}[m_d^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{5}{36} \sum_p g_1^4 LF_{4,-1}[m_d^p] \delta_{i1i2} \delta_{i3i4} + \frac{8}{135} \sum_p g_1^4 LF_{5,-2}[m_d^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{3}{2} s_\gamma \frac{1}{m_e^4} \overline{y_d^{pr}} y_d^{pr} \overline{y_e^{-i2i3}} y_e^{i1i4} (-s_{2\gamma} c_\gamma + s_\gamma^3) LF_{1,0}[m_d^r] - \\ & \quad \frac{1}{4} \sum_p s_\gamma g_1^2 \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} (2 s_{2\gamma} c_\gamma + s_\gamma c_{2\gamma}) LF_{1,0}[m_e^p] + \frac{2}{9} \sum_p g_1^4 LF_{3,0}[m_e^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{5}{12} \sum_p g_1^4 LF_{4,-1}[m_e^p] \delta_{i1i2} \delta_{i3i4} + \frac{8}{45} \sum_p g_1^4 LF_{5,-2}[m_e^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{1}{2} s_\gamma \frac{1}{m_e^4} \overline{y_e^{pr}} \overline{y_e^{-i2i3}} y_e^{pr} y_e^{i1i4} (-s_{2\gamma} c_\gamma + s_\gamma^3) LF_{1,0}[m_e^r] + \\ & \quad \frac{1}{4} s_\gamma \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} (2 \overline{y_e^{pr}} y_e^{pr} (s_{2\gamma} c_\gamma - s_\gamma^3) + \sum_p g_1^2 (2 s_{2\gamma} c_\gamma + s_\gamma c_{2\gamma})) LF_{1,0}[m_l^p] + \\ & \quad \frac{1}{9} \sum_p g_1^4 LF_{3,0}[m_l^p] \delta_{i1i2} \delta_{i3i4} - \frac{5}{24} \sum_p g_1^4 LF_{4,-1}[m_l^p] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{4}{45} \sum_p g_1^4 LF_{5,-2}[m_l^p] \delta_{i1i2} \delta_{i3i4} - \frac{1}{4} s_\gamma \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} \\ & \quad (6 \overline{y_d^{pr}} y_d^{pr} (-s_{2\gamma} c_\gamma + s_\gamma^3) + 6 c_\gamma \overline{y_d^{pr}} y_d^{pr} (s_{2\gamma} + s_\gamma c_\gamma) + \sum_p g_1^2 (2 s_{2\gamma} c_\gamma + s_\gamma c_{2\gamma})) \\ & \quad LF_{1,0}[m_q^p] + \frac{1}{27} \sum_p g_1^4 LF_{3,0}[m_q^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{5}{72} \sum_p g_1^4 LF_{4,-1}[m_q^p] \delta_{i1i2} \delta_{i3i4} + \frac{4}{135} \sum_p g_1^4 LF_{5,-2}[m_q^p] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{1}{2} \sum_p s_\gamma g_1^2 \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} (2 s_{2\gamma} c_\gamma + s_\gamma c_{2\gamma}) LF_{1,0}[m_u^p] + \frac{8}{27} \sum_p g_1^4 LF_{3,0}[m_u^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{5}{9} \sum_p g_1^4 LF_{4,-1}[m_u^p] \delta_{i1i2} \delta_{i3i4} + \frac{32}{135} \sum_p g_1^4 LF_{5,-2}[m_u^p] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{3}{2} s_\gamma c_\gamma \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} \overline{y_u^{pr}} y_u^{pr} (s_{2\gamma} + s_\gamma c_\gamma) LF_{1,0}[m_u^r] - \frac{1}{8} s_\gamma \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} \\ & \quad (3 s_{4\gamma} c_\gamma (g_1^2 + g_2^2) + s_\gamma (g_1^2 (-1 + 3 c_{2\gamma}^2) + 3 g_2^2 (-1 + c_{2\gamma}^2))) LF_{1,0}[m_\Phi] + \\ & \quad \frac{1}{8} \frac{1}{m_e^2} (3 s_{4\gamma} \overline{y_e^{pr}} \overline{y_e^{-i2i3}} y_e^{pi4} y_e^{i1r} + s_\gamma^2 y_e^{i1i4} (-2 \overline{y_e^{-i2i3}} (g_1^2 + 3 g_2^2) + 3 s_\gamma^2 \overline{y_e^{ri3}} \overline{y_e^{-i2p}} y_e^{rp})) \\ & \quad LF_{1,1}[m_\Phi] + \frac{1}{24} s_\gamma^2 (3 \overline{y_e^{-i2i3}} y_e^{i1i4} (g_1^2 + 3 g_2^2) - 4 g_1^2 \overline{y_e^{pi3}} y_e^{pi4} \delta_{i1i2} - \\ & \quad 4 \overline{y_e^{-i2p}} y_e^{i1p} (3 c_\gamma^2 \overline{y_e^{ri3}} y_e^{ri4} + 2 g_1^2 \delta_{i3i4})) LF_{1,2}[m_\Phi] + \\ & \quad \frac{1}{12} s_\gamma^2 (-g_1^2 \overline{y_e^{pi3}} y_e^{pi4} \delta_{i1i2} + \overline{y_e^{-i2p}} y_e^{i1p} (-3 s_\gamma^2 \overline{y_e^{ri3}} y_e^{ri4} + g_1^2 \delta_{i3i4})) LF_{2,1}[m_\Phi] + \\ & \quad \frac{1}{36} g_1^2 (3 s_\gamma^2 \overline{y_e^{pi3}} y_e^{pi4} \delta_{i1i2} + (-3 s_\gamma^2 \overline{y_e^{-i2p}} y_e^{i1p} + 4 g_1^2 \delta_{i1i2}) \delta_{i3i4}) LF_{3,0}[m_\Phi] - \\ & \quad \frac{5}{24} g_1^4 LF_{4,-1}[m_\Phi] \delta_{i1i2} \delta_{i3i4} + \frac{4}{45} g_1^4 LF_{5,-2}[m_\Phi] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{1}{9} g_1^4 LF_{3,0}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{6} g_1^4 LF_{4,-1}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} - \\ & \quad \frac{8}{45} g_1^4 LF_{5,-2}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{2} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,0}[m_1, m_e^{i3}] - \\ & \quad \frac{1}{4} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{2,1,-1}[m_1, m_e^{i3}] + \frac{1}{2} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,0}[m_1, m_e^{i4}] - \\ & \quad \frac{1}{4} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{2,1,-1}[m_1, m_e^{i4}] + \frac{1}{6} g_1^4 LF_{2,1,0}[m_1, m_e^{i4}] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{1}{6} g_1^4 LF_{2,2,-1}[m_1, m_e^{i4}] \delta_{i1i2} \delta_{i3i4} - \frac{1}{3} g_1^4 LF_{3,1,-1}[m_1, m_e^{i4}] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{1}{6} g_1^4 LF_{4,1,-2}[m_1, m_e^{i4}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{8} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,0}[m_1, m_l^{i1}] - \\ & \quad \frac{1}{16} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{2,1,-1}[m_1, m_l^{i1}] + \frac{1}{8} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,0}[m_1, m_l^{i2}] - \\ & \quad \frac{1}{16} g_1^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{2,1,-1}[m_1, m_l^{i2}] + \frac{1}{24} g_1^4 LF_{2,1,0}[m_1, m_l^{i2}] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{1}{24} g_1^4 LF_{2,2,-1}[m_1, m_l^{i2}] \delta_{i1i2} \delta_{i3i4} - \frac{1}{12} g_1^4 LF_{3,1,-1}[m_1, m_l^{i2}] \delta_{i1i2} \delta_{i3i4} + \\ & \quad \frac{1}{24} g_1^4 LF_{4,1,-2}[m_1, m_l^{i2}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{2} g_1^2 \frac{1}{m_e^4} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,-1}[m_1, \tilde{\mu}] + \\ & \quad m_1 s_\gamma \tilde{\mu} c_\gamma g_1^2 \frac{1}{m_e^4} \overline{y_e^{-i2i3}} y_e^{i1i4} (c_\gamma^2 - 2 s_\gamma^2) LF_{1,1,0}[m_1, \tilde{\mu}] + \\ & \quad \frac{3}{8} g_2^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,0}[m_2, m_l^{i1}] - \\ & \quad \frac{3}{16} g_2^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{2,1,-1}[m_2, m_l^{i1}] + \frac{3}{8} g_2^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{1,1,0}[m_2, m_l^{i2}] - \\ & \quad \frac{3}{16} g_2^2 \frac{1}{m_e^2} s_\gamma^2 \overline{y_e^{-i2i3}} y_e^{i1i4} LF_{2,1,-1}[m_2, m_l^{i2}] + \frac$$