

$$\begin{aligned}
& \frac{1}{16\pi^2} \left( \frac{1}{324} \frac{1}{m_e^2} s_Y^2 \overline{y_d}^{pi3} (y_d^{pi4} (-81 c_Y^2 \overline{y_d}^{ri1} y_d^{ri2} + (g_1^2 + 12 g_3^2) \delta_{i1i2}) - 36 g_3^2 y_d^{pi2} \delta_{i1i4}) + \right. \\
& \frac{1}{18} g_3^4 (3 \delta_{i1i4} \delta_{i2i3} - \delta_{i1i2} \delta_{i3i4}) LF_{3,0}[m_3] + \frac{1}{12} g_3^4 (3 \delta_{i1i4} \delta_{i2i3} - \delta_{i1i2} \delta_{i3i4}) LF_{4,-1}[m_3] + \\
& \frac{4}{45} g_3^4 (-3 \delta_{i1i4} \delta_{i2i3} + \delta_{i1i2} \delta_{i3i4}) LF_{5,-2}[m_3] + \\
& \frac{1}{486} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (4 g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{3,0}[m_d^P] - \\
& \frac{5}{1296} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (4 g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{4,-1}[m_d^P] + \\
& \frac{2}{1215} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (4 g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{5,-2}[m_d^P] + \\
& \frac{2}{81} \sum_p g_1^4 LF_{3,0}[m_e^P] \delta_{i1i2} \delta_{i3i4} - \frac{5}{108} \sum_p g_1^4 LF_{4,-1}[m_e^P] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{8}{405} \sum_p g_1^4 LF_{5,-2}[m_e^P] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} \sum_p g_1^4 LF_{3,0}[m_l^P] \delta_{i1i2} \delta_{i3i4} - \\
& \frac{5}{216} \sum_p g_1^4 LF_{4,-1}[m_l^P] \delta_{i1i2} \delta_{i3i4} + \frac{4}{405} \sum_p g_1^4 LF_{5,-2}[m_l^P] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{1}{243} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{3,0}[m_q^P] - \\
& \frac{5}{648} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{4,-1}[m_q^P] + \\
& \frac{4}{1215} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{5,-2}[m_q^P] + \\
& \frac{1}{486} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (16 g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{3,0}[m_u^P] - \\
& \frac{5}{1296} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (16 g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{4,-1}[m_u^P] + \\
& \frac{2}{1215} \sum_p (27 g_3^4 \delta_{i1i4} \delta_{i2i3} + (16 g_1^4 - 9 g_3^4) \delta_{i1i2} \delta_{i3i4}) LF_{5,-2}[m_u^P] + \\
& \frac{1}{54} s_Y^2 \overline{y_d}^{pi3} (y_d^{pi4} (27 c_Y^2 \overline{y_d}^{ri1} y_d^{ri2} + 2 (g_1^2 + 3 g_3^2) \delta_{i1i2}) - 18 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{1,2}[m_\Phi] + \\
& \frac{1}{36} s_Y^2 \overline{y_d}^{pi3} y_d^{pi4} (9 s_Y^2 \overline{y_d}^{ri1} y_d^{ri2} - 2 g_1^2 \delta_{i1i2}) LF_{2,1}[m_\Phi] + \\
& \frac{1}{162} g_1^2 (9 s_Y^2 \overline{y_d}^{pi3} y_d^{pi4} + 2 g_1^2 \delta_{i3i4}) LF_{3,0}[m_\Phi] \delta_{i1i2} - \frac{5}{216} g_1^4 LF_{4,-1}[m_\Phi] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{4}{405} g_1^4 LF_{5,-2}[m_\Phi] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} g_1^4 LF_{3,0}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{1}{54} g_1^4 LF_{4,-1}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} - \frac{8}{405} g_1^4 LF_{5,-2}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{1}{486} g_1^2 (9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (2 g_1^2 - 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{2,1,0}[m_1, m_d^{i4}] + \\
& \frac{1}{486} g_1^2 (9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (2 g_1^2 - 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{2,2,-1}[m_1, m_d^{i4}] + \\
& \frac{1}{243} g_1^2 (-9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (-2 g_1^2 + 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{3,1,-1}[m_1, m_d^{i4}] + \\
& \frac{1}{486} g_1^2 (9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (2 g_1^2 - 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{4,1,-2}[m_1, m_d^{i4}] + \\
& \frac{1}{324} (-9 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 (16 g_1^2 + 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{2,1,0}[m_3, m_d^{i4}] + \\
& \frac{1}{324} (-9 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 (16 g_1^2 + 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{2,2,-1}[m_3, m_d^{i4}] + \\
& \frac{1}{324} (-225 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 (-32 g_1^2 + 75 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{3,1,-1}[m_3, m_d^{i4}] + \\
& \frac{2}{81} g_3^2 (9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (2 g_1^2 - 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{4,1,-2}[m_3, m_d^{i4}] + \\
& \frac{1}{243} g_1^2 (-9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (-2 g_1^2 + 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{2,1,0}[m_d^{i4}, m_1] + \\
& \frac{1}{486} g_1^2 (9 g_3^2 \delta_{i1i4} \delta_{i2i3} + (2 g_1^2 - 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{3,1,-1}[m_d^{i4}, m_1] + \\
& \frac{1}{162} (9 g_3^4 \delta_{i1i4} \delta_{i2i3} - g_3^2 (16 g_1^2 + 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{2,1,0}[m_d^{i4}, m_3] + \\
& \frac{1}{324} (-9 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 (16 g_1^2 + 3 g_3^2) \delta_{i1i2} \delta_{i3i4}) LF_{3,1,-1}[m_d^{i4}, m_3] + \\
& \frac{1}{27} \overline{y_d}^{pi3} (y_d^{pi4} (g_1^2 + 3 g_3^2) \delta_{i1i2} - 9 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{2,1,0}[m_q^P, \tilde{\mu}] + \\
& \frac{1}{54} \overline{y_d}^{pi3} (-y_d^{pi4} (g_1^2 + 3 g_3^2) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{2,2,-1}[m_q^P, \tilde{\mu}] + \\
& \frac{1}{54} \overline{y_d}^{pi3} (-y_d^{pi4} (g_1^2 + 3 g_3^2) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{3,1,-1}[m_q^P, \tilde{\mu}] + \\
& \frac{1}{54} \overline{y_d}^{pi3} (-y_d^{pi4} (g_1^2 + 3 g_3^2) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{2,1,0}[\tilde{\mu}, m_q^P] + \\
& \frac{1}{54} \overline{y_d}^{pi3} (y_d^{pi4} (-7 g_1^2 + 6 g_3^2) \delta_{i1i2} - 18 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{3,1,-1}[\tilde{\mu}, m_q^P] + \\
& \frac{1}{54} \overline{y_d}^{pi3} (y_d^{pi4} (2 g_1^2 - 3 g_3^2) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4}) LF_{4,1,-2}[\tilde{\mu}, m_q^P] + \\
& \frac{1}{162} g_1^4 LF_{2,1,1,-1}[m_1, m_d^{i4}, m_d^{i2}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} g_1^4 m_1^2 LF_{2,1,1,0}[m_1, m_d^{i4}, m_d^{i2}] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{1}{72} g_3^4 LF_{2,1,1,-1}[m_3, m_d^{i4}, m_d^{i2}] \delta_{i1i2} \delta_{i3i4} + \frac{5}{18} g_3^4 m_3^2 LF_{2,1,1,0}[m_3, m_d^{i4}, m_d^{i2}] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{7}{24} g_3^4 LF_{2,1,1,-1}[m_3, m_d^{i4}, m_d^{i3}] \delta_{i1i4} \delta_{i2i3} - \frac{1}{6} g_3^4 m_3^2 LF_{2,1,1,0}[m_3, m_d^{i4}, m_d^{i3}] \delta_{i1i4} \delta_{i2i3} + \\
& \frac{1}{4} \overline{y_d}^{pi3} \overline{y_d}^{ri1} y_d^{pi4} y_d^{ri2} LF_{2,1,1,-1}[\tilde{\mu}, m_q^P, m_q^R] - \frac{1}{54} g_1^2 g_3^2 LF_{1,1,1,1,-1}[m_1, m_3, m_d^{i4}, m_d^{i2}] \\
& \delta_{i1i2} \delta_{i3i4} - \frac{1}{27} m_1 m_3 g_1^2 g_3^2 LF_{1,1,1,1,0}[m_1, m_3, m_d^{i4}, m_d^{i2}] \delta_{i1i2} \delta_{i3i4} + \\
& \frac{1}{18} g_1^2 g_3^2 LF_{1,1,1,1,-1}[m_1, m_3, m_d^{i4}, m_d^{i3}] \delta_{i1i4} \delta_{i2i3} + \\
& \left. \frac{1}{9} m_1 m_3 g_1^2 g_3^2 LF_{1,1,1,1,0}[m_1, m_3, m_d^{i4}, m_d^{i3}] \delta_{i1i4} \delta_{i2i3} \right)
\end{aligned}$$