

$$\begin{aligned}
& \hbar \left( \frac{1}{108} \frac{1}{m_e^2} s_\gamma^2 (\overline{y_d^{pi3}} y_d^{pi4} (54 c_\gamma^2 \overline{y_e^{ri1}} y_e^{ri2} + g_1^2 \delta_{i1i2}) - 5 g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \delta_{i3i4}) + \frac{4}{81} \sum_{\mathbf{p}} g_1^4 \right. \\
& \quad \text{LF}_{3,0} [m_d^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} - \frac{5}{54} \sum_{\mathbf{p}} g_1^4 \text{LF}_{4,-1} [m_d^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \frac{16}{405} \sum_{\mathbf{p}} g_1^4 \text{LF}_{5,-2} [m_d^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{4}{27} \sum_{\mathbf{p}} g_1^4 \text{LF}_{3,0} [m_e^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} - \frac{5}{18} \sum_{\mathbf{p}} g_1^4 \text{LF}_{4,-1} [m_e^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{16}{135} \sum_{\mathbf{p}} g_1^4 \text{LF}_{5,-2} [m_e^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \frac{2}{27} \sum_{\mathbf{p}} g_1^4 \text{LF}_{3,0} [m_l^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} - \\
& \quad \frac{135}{36} \sum_{\mathbf{p}} g_1^4 \text{LF}_{4,-1} [m_l^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \frac{8}{135} \sum_{\mathbf{p}} g_1^4 \text{LF}_{5,-2} [m_l^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{2}{81} \sum_{\mathbf{p}} g_1^4 \text{LF}_{3,0} [m_q^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} - \frac{5}{108} \sum_{\mathbf{p}} g_1^4 \text{LF}_{4,-1} [m_q^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{8}{405} \sum_{\mathbf{p}} g_1^4 \text{LF}_{5,-2} [m_q^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \frac{16}{81} \sum_{\mathbf{p}} g_1^4 \text{LF}_{3,0} [m_u^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} - \\
& \quad \frac{10}{27} \sum_{\mathbf{p}} g_1^4 \text{LF}_{4,-1} [m_u^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \frac{64}{405} \sum_{\mathbf{p}} g_1^4 \text{LF}_{5,-2} [m_u^{\mathbf{p}}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{9} s_\gamma^2 (\overline{y_d^{pi3}} y_d^{pi4} (9 c_\gamma^2 \overline{y_e^{ri1}} y_e^{ri2} + g_1^2 \delta_{i1i2}) - g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \delta_{i3i4}) \text{LF}_{1,2} [m_\Phi] + \\
& \quad \frac{1}{18} s_\gamma^2 (3 \overline{y_d^{pi3}} y_d^{pi4} (3 s_\gamma^2 \overline{y_e^{ri1}} y_e^{ri2} - g_1^2 \delta_{i1i2}) - g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \delta_{i3i4}) \text{LF}_{2,1} [m_\Phi] + \\
& \quad \frac{1}{54} g_1^2 (9 s_\gamma^2 \overline{y_d^{pi3}} y_d^{pi4} \delta_{i1i2} + (3 s_\gamma^2 \overline{y_e^{pi1}} y_e^{pi2} + 4 g_1^2 \delta_{i1i2}) \delta_{i3i4}) \text{LF}_{3,0} [m_\Phi] - \\
& \quad \frac{5}{36} g_1^4 \text{LF}_{4,-1} [m_\Phi] \delta_{i1i2} \delta_{i3i4} + \frac{8}{135} g_1^4 \text{LF}_{5,-2} [m_\Phi] \delta_{i1i2} \delta_{i3i4} + \frac{2}{27} g_1^4 \text{LF}_{3,0} [\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{9} g_1^4 \text{LF}_{4,-1} [\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} - \frac{16}{135} g_1^4 \text{LF}_{5,-2} [\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} g_1^4 \text{LF}_{2,1,0} [m_1, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{81} g_1^4 \text{LF}_{2,2,-1} [m_1, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} - \frac{2}{81} g_1^4 \text{LF}_{3,1,-1} [m_1, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{81} g_1^4 \text{LF}_{4,1,-2} [m_1, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{9} g_1^4 \text{LF}_{2,1,0} [m_1, m_e^{i2}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{9} g_1^4 \text{LF}_{2,2,-1} [m_1, m_e^{i2}] \delta_{i1i2} \delta_{i3i4} - \frac{2}{9} g_1^4 \text{LF}_{3,1,-1} [m_1, m_e^{i2}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{9} g_1^4 \text{LF}_{4,1,-2} [m_1, m_e^{i2}] \delta_{i1i2} \delta_{i3i4} + \frac{4}{27} g_1^2 g_3^2 \text{LF}_{2,1,0} [m_3, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{4}{27} g_1^2 g_3^2 \text{LF}_{2,2,-1} [m_3, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} - \frac{8}{27} g_1^2 g_3^2 \text{LF}_{3,1,-1} [m_3, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{4}{27} g_1^2 g_3^2 \text{LF}_{4,1,-2} [m_3, m_d^{i4}] \delta_{i1i2} \delta_{i3i4} - \frac{2}{81} g_1^4 \text{LF}_{2,1,0} [m_d^{i4}, m_1] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{81} g_1^4 \text{LF}_{3,1,-1} [m_d^{i4}, m_1] \delta_{i1i2} \delta_{i3i4} - \frac{8}{27} g_1^2 g_3^2 \text{LF}_{2,1,0} [m_d^{i4}, m_3] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{4}{27} g_1^2 g_3^2 \text{LF}_{3,1,-1} [m_d^{i4}, m_3] \delta_{i1i2} \delta_{i3i4} - \frac{2}{9} g_1^4 \text{LF}_{2,1,0} [m_e^{i2}, m_1] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \frac{1}{9} g_1^4 \text{LF}_{3,1,-1} [m_e^{i2}, m_1] \delta_{i1i2} \delta_{i3i4} - \frac{1}{9} g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \text{LF}_{2,1,0} [m_l^{\mathbf{p}}, \tilde{\mu}] \delta_{i3i4} + \\
& \quad \frac{1}{18} g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \text{LF}_{2,2,-1} [m_l^{\mathbf{p}}, \tilde{\mu}] \delta_{i3i4} + \frac{1}{18} g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \text{LF}_{3,1,-1} [m_l^{\mathbf{p}}, \tilde{\mu}] \delta_{i3i4} + \\
& \quad \frac{1}{9} g_1^2 \overline{y_d^{pi3}} y_d^{pi4} \text{LF}_{2,1,0} [m_q^{\mathbf{p}}, \tilde{\mu}] \delta_{i1i2} - \frac{1}{18} g_1^2 \overline{y_d^{pi3}} y_d^{pi4} \text{LF}_{2,2,-1} [m_q^{\mathbf{p}}, \tilde{\mu}] \delta_{i1i2} - \\
& \quad \frac{1}{18} g_1^2 \overline{y_d^{pi3}} y_d^{pi4} \text{LF}_{3,1,-1} [m_q^{\mathbf{p}}, \tilde{\mu}] \delta_{i1i2} + \frac{1}{18} g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \text{LF}_{2,1,0} [\tilde{\mu}, m_l^{\mathbf{p}}] \delta_{i3i4} - \\
& \quad \frac{5}{18} g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \text{LF}_{3,1,-1} [\tilde{\mu}, m_l^{\mathbf{p}}] \delta_{i3i4} + \frac{1}{9} g_1^2 \overline{y_e^{pi1}} y_e^{pi2} \text{LF}_{4,1,-2} [\tilde{\mu}, m_l^{\mathbf{p}}] \delta_{i3i4} - \\
& \quad \frac{1}{18} g_1^2 \overline{y_d^{pi3}} y_d^{pi4} \text{LF}_{2,1,0} [\tilde{\mu}, m_q^{\mathbf{p}}] \delta_{i1i2} - \frac{7}{18} g_1^2 \overline{y_d^{pi3}} y_d^{pi4} \text{LF}_{3,1,-1} [\tilde{\mu}, m_q^{\mathbf{p}}] \delta_{i1i2} + \\
& \quad \frac{1}{9} g_1^2 \overline{y_d^{pi3}} y_d^{pi4} \text{LF}_{4,1,-2} [\tilde{\mu}, m_q^{\mathbf{p}}] \delta_{i1i2} + \frac{1}{9} g_1^4 \text{LF}_{2,1,1,-1} [m_1, m_d^{i4}, m_e^{i2}] \delta_{i1i2} \delta_{i3i4} + \\
& \quad \left. \frac{2}{9} g_1^4 m_1^2 \text{LF}_{2,1,1,0} [m_1, m_d^{i4}, m_e^{i2}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{2} \overline{y_d^{pi3}} y_d^{pi4} \overline{y_e^{ri1}} y_e^{ri2} \text{LF}_{2,1,1,-1} [\tilde{\mu}, m_l^{\mathbf{r}}, m_q^{\mathbf{p}}] \right)
\end{aligned}$$