$$
C_{dd}^{i1\_i2\_i3\_i4\_} \to
$$

$$
\hbar \left(\frac{1}{324} \frac{1}{m_{\oplus}^2} s_\gamma^2 \overline{y_d}^{pi3} \left(y_d^{pi4} \left(-81 c_\gamma^2 \overline{y_d}^{ri1} y_d^{ri2} + \left(g_1^2 + 12 g_3^2 \right) \delta_{i1i2} \right) - 36 g_3^2 y_d^{pi2} \delta_{i1i4} \right) + \right.
$$

$$
\frac{1}{18} g_3^4 \left(3 \delta_{i1i4} \delta_{i2i3} - \delta_{i1i2} \delta_{i3i4} \right) LF_{3,0}[m_3] + \frac{1}{12} g_3^4 \left(3 \delta_{i1i4} \delta_{i2i3} - \delta_{i1i2} \delta_{i3i4} \right) LF_{4,-1}[m_3] +
$$

$$
\frac{4}{45} g_3^4 \left(-3 \delta_{i1i4} \delta_{i2i3} + \delta_{i1i2} \delta_{i3i4} \right) LF_{5,-2}[m_3] +
$$

$$
\frac{1}{486} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(4 g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,0}\left[m_{\tilde{d}}^p \right] -
$$

$$
\frac{5}{1296} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(4 g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{4,-1}\left[m_{\tilde{d}}^p \right] +
$$

$$
\frac{2}{1215} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(4 g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{5,-2}\left[m_{\tilde{d}}^p \right] +
$$

$$
\frac{2}{81} \sum_p g_1^4 LF_{3,0}\left[m_{\tilde{e}}^p \right] \delta_{i1i2} \delta_{i3i4} - \frac{5}{108} \sum_p g_1^4 LF_{4,-1}\left[m_{\tilde{e}}^p \right] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{8}{405} \sum_p g_1^4 LF_{5,-2}\left[m_{\tilde{e}}^p \right] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} \sum_p g_1^4 LF_{3,0}\left[m_{\tilde{l}}^p \right] \delta_{i1i2} \delta_{i3i4} -
$$

$$
\frac{5}{216} \sum_p g_1^4 LF_{4,-1}\left[m_{\tilde{l}}^p \right] \delta_{i1i2} \delta_{i3i4} + \frac{4}{405} \sum_p g_1^4 LF_{5,-2}\left[m_{\tilde{l}}^p \right] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{1}{243} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,0}\left[m_{\tilde{q}}^p \right] -
$$

$$
\frac{5}{648} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{4,-1}\left[m_{\tilde{q}}^p \right] +
$$

$$
\frac{4}{1215} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{5,-2}\left[m_{\tilde{q}}^p \right] +
$$

$$
\frac{1}{486} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(16 g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,0}\left[m_{\tilde{u}}^p \right] -
$$

$$
\frac{5}{1296} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(16 g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{4,-1}\left[m_{\tilde{u}}^p \right] +
$$

$$
\frac{2}{1215} \sum_p \left(27 g_3^4 \delta_{i1i4} \delta_{i2i3} + \left(16 g_1^4 - 9 g_3^4 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{5,-2}\left[m_{\tilde{u}}^p \right] +
$$

$$
\frac{1}{54} s_\gamma^2 \overline{y_d}^{pi3} \left(y_d^{pi4} \left(27 c_\gamma^2 \overline{y_d}^{ri1} y_d^{ri2} + 2 \left(g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \right) - 18 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{1,2}[m_{\oplus}] +
$$

$$
\frac{1}{36} s_\gamma^2 \overline{y_d}^{pi3} y_d^{pi4} \left(9 s_\gamma^2 \overline{y_d}^{ri1} y_d^{ri2} - 2 g_1^2 \delta_{i1i2} \right) LF_{2,1}[m_{\oplus}] +
$$

$$
\frac{1}{162} g_1^2 \left(9 s_\gamma^2 \overline{y_d}^{pi3} y_d^{pi4} + 2 g_1^2 \delta_{i3i4} \right) LF_{3,0}[m_{\oplus}] \delta_{i1i2} - \frac{5}{216} g_1^4 LF_{4,-1}[m_{\oplus}] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{4}{405} g_1^4 LF_{5,-2}[m_{\oplus}] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} g_1^4 LF_{3,0}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{1}{54} g_1^4 LF_{4,-1}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} - \frac{8}{405} g_1^4 LF_{5,-2}[\tilde{\mu}] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{1}{486} g_1^2 \left(9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(2 g_1^2 - 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{2,1,0}\left[m_1, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{486} g_1^2 \left(9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(2 g_1^2 - 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{2,2,-1}\left[m_1, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{243} g_1^2 \left(-9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(-2 g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,1,-1}\left[m_1, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{486} g_1^2 \left(9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(2 g_1^2 - 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{4,1,-2}\left[m_1, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{324} \left(-9 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 \left(16 g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{2,1,0}\left[m_3, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{324} \left(-9 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 \left(16 g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{2,2,-1}\left[m_3, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{324} \left(-225 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 \left(-32 g_1^2 + 75 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,1,-1}\left[m_3, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{2}{81} g_3^2 \left(9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(2 g_1^2 - 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{4,1,-2}\left[m_3, m_{\tilde{d}}^{i4} \right] +
$$

$$
\frac{1}{243} g_1^2 \left(-9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(-2 g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{2,1,0}\left[m_{\tilde{d}}^{i4}, m_1 \right] +
$$

$$
\frac{1}{486} g_1^2 \left(9 g_3^2 \delta_{i1i4} \delta_{i2i3} + \left(2 g_1^2 - 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,1,-1}\left[m_{\tilde{d}}^{i4}, m_1 \right] +
$$

$$
\frac{1}{162} \left(9 g_3^4 \delta_{i1i4} \delta_{i2i3} - g_3^2 \left(16 g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{2,1,0}\left[m_{\tilde{d}}^{i4}, m_3 \right] +
$$

$$
\frac{1}{324} \left(-9 g_3^4 \delta_{i1i4} \delta_{i2i3} + g_3^2 \left(16 g_1^2 + 3 g_3^2 \right) \delta_{i1i2} \delta_{i3i4} \right) LF_{3,1,-1}\left[m_{\tilde{d}}^{i4}, m_3 \right] +
$$

$$
\frac{1}{27} \overline{y_d}^{pi3} \left(y_d^{pi4} \left(g_1^2 + 3 g_3^2 \right) \delta_{i1i2} - 9 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{2,1,0}\left[m_{\tilde{q}}^p, \tilde{\mu} \right] +
$$

$$
\frac{1}{54} \overline{y_d}^{pi3} \left(-y_d^{pi4} \left(g_1^2 + 3 g_3^2 \right) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{2,2,-1}\left[m_{\tilde{q}}^p, \tilde{\mu} \right] +
$$

$$
\frac{1}{54} \overline{y_d}^{pi3} \left(-y_d^{pi4} \left(g_1^2 + 3 g_3^2 \right) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{3,1,-1}\left[m_{\tilde{q}}^p, \tilde{\mu} \right] +
$$

$$
\frac{1}{54} \overline{y_d}^{pi3} \left(-y_d^{pi4} \left(g_1^2 + 3 g_3^2 \right) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{2,1,0}\left[\tilde{\mu}, m_{\tilde{q}}^p \right] +
$$

$$
\frac{1}{54} \overline{y_d}^{pi3} \left(y_d^{pi4} \left(-7 g_1^2 + 6 g_3^2 \right) \delta_{i1i2} - 18 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{3,1,-1}\left[\tilde{\mu}, m_{\tilde{q}}^p \right] +
$$

$$
\frac{1}{54} \overline{y_d}^{pi3} \left(y_d^{pi4} \left(2 g_1^2 - 3 g_3^2 \right) \delta_{i1i2} + 9 g_3^2 y_d^{pi2} \delta_{i1i4} \right) LF_{4,1,-2}\left[\tilde{\mu}, m_{\tilde{q}}^p \right] +
$$

$$
\frac{1}{162} g_1^4 LF_{2,1,1,-1}\left[m_1, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i2} \right] \delta_{i1i2} \delta_{i3i4} + \frac{1}{81} g_1^4 m_1^2 LF_{2,1,1,0}\left[m_1, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i2} \right] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{1}{72} g_3^4 LF_{2,1,1,-1}\left[m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i2} \right] \delta_{i1i2} \delta_{i3i4} + \frac{5}{18} g_3^4 m_3^2 LF_{2,1,1,0}\left[m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i2} \right] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{7}{24} g_3^4 LF_{2,1,1,-1}\left[m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i3} \right] \delta_{i1i4} \delta_{i2i3} - \frac{1}{6} g_3^4 m_3^2 LF_{2,1,1,0}\left[m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i3} \right] \delta_{i1i4} \delta_{i2i3} +
$$

$$
\frac{1}{4} \overline{y_d}^{pi3} \overline{y_d}^{ri1} y_d^{pi4} y_d^{ri2} LF_{2,1,1,-1}\left[\tilde{\mu}, m_{\tilde{q}}^p, m_{\tilde{q}}^r \right] - \frac{1}{54} g_1^2 g_3^2 LF_{1,1,1,1,-1}\left[m_1, m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i2} \right]
$$

$$
\delta_{i1i2} \delta_{i3i4} - \frac{1}{27} m_1 m_3 g_1^2 g_3^2 LF_{1,1,1,1,0}\left[m_1, m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i2} \right] \delta_{i1i2} \delta_{i3i4} +
$$

$$
\frac{1}{18} g_1^2 g_3^2 LF_{1,1,1,1,-1}\left[m_1, m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i3} \right] \delta_{i1i4} \delta_{i2i3} +
$$

$$
\left. \frac{1}{9} m_1 m_3 g_1^2 g_3^2 LF_{1,1,1,1,0}\left[m_1, m_3, m_{\tilde{d}}^{i4}, m_{\tilde{d}}^{i3} \right] \delta_{i1i4} \delta_{i2i3} \right)
$$