$$I_4^{\{D=4-2\epsilon\}}(m^2, p_2^2, p_3^2, m^2; s_{12}, s_{23}; 0, m^2, m^2, m^2)$$

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Integral obtained from Eq.(A4), Equation 6 of ref. [1]

$$I_4^{\{D=4-2\epsilon\}}(m^2, p_2^2, p_3^2, m^2; s_{12}, s_{23}; 0, m^2, m^2, m^2) = \left(\frac{\mu^2}{m^2}\right)^\epsilon \frac{1}{(s_{12} - m^2)s_{23}\beta_{s_{23}}}$$

$$\times \left[\frac{1}{\epsilon}\ln(x_{s_{23}}) - \sum_{\rho, \sigma = \pm 1} \mathcal{L}i_2(x_{s_{23}}, x_{p_3^2}^\rho, x_{p_2^2}^\sigma) - \text{Li}_2(x_{s_{23}}^2) - 2\ln(x_{s_{23}})\ln(1 - x_{s_{23}}^2)\right.$$

$$\left. - 2\ln(x_{s_{23}})\ln\left(1 - \frac{s_{12}}{m^2}\right) - \ln^2(x_{p_3^2}) - \ln^2(x_{p_2^2}) + \frac{\pi^2}{6}\right] + \mathcal{O}(\epsilon).$$

See the file on notation. We make use of the quantities

$$\beta_r = \sqrt{1 - \frac{4m^2}{r}}, \qquad x_r = \frac{\beta_r - 1}{\beta_r + 1},$$

where r represents a generic invariant. The following specific combinations of logarithms and dilogarithms were used, Analytic continuation by the replacements $s_{ij} \to s_{ij} + i\varepsilon, p_j^2 \to p_j^2 + i\varepsilon$.

$$\mathcal{L}i_2(x, y, z) = \text{Li}_2(1 - xyz) + \ln(1 - xyz)\Big[\ln(xyz) - \ln(x) - \ln(y) - \ln(z)\Big].$$

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References

[1] W. Beenakker, S. Dittmaier, M. Kramer, B. Plumper, M. Spira and P. M. Zerwas, Nucl. Phys. B **653**, 151 (2003) [arXiv:hep-ph/0211352]. [arXiv:hep-ph/0211352]