

Tadpole integral

The definition of the tadpole integral is as follows

$$I_1^{\{D\}}(m_1^2) = \frac{\mu^{4-D}}{i\pi^{\frac{D}{2}} r_\Gamma} \int d^D l \frac{1}{(l^2 - m_1^2 + i\varepsilon)}$$

μ is a scale introduced so that the integrals preserve their natural dimensions, despite excursions away from $D = 4$.

The result for the integral is,

$$\begin{aligned} I_1^{\{D=4-2\epsilon\}}(m^2) &= -\mu^{2\epsilon} \frac{\Gamma(-1 + \epsilon)}{r_\Gamma} [m^2 - i\varepsilon]^{1-\epsilon} \\ &= m^2 \left(\frac{\mu^2}{m^2 - i\varepsilon} \right)^\epsilon \left[\frac{1}{\epsilon} + 1 \right] + \mathcal{O}(\epsilon) \end{aligned}$$

[Back to QCDLoop Home page](#)