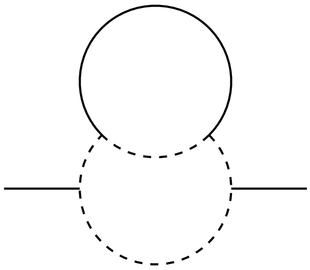
metric convention: $(+,-,-,-)$
Lagrangian:

$$\mathcal{L} = \frac{1}{2}\partial_\mu\phi\partial^\mu\phi - \frac{1}{2}M^2\phi^2 + \partial_\mu\chi^\dagger\partial^\mu\chi - m^2\chi^\dagger\chi - g_3\phi\chi^\dagger\chi - g_4\phi^2\chi^\dagger\chi.$$

1 Diagram 1



$$\Pi_1(p^2) = g_3^4 \int \frac{d^dq}{(2\pi)^d}\frac{d^dr}{(2\pi)^d}\left(\frac{1}{q^2-m^2}\right)^2 \frac{1}{r^2-m^2}\frac{1}{(p-q)^2-m^2}\frac{1}{(q-r)^2-M^2}.$$

First loop evaluation (r):

$$\begin{aligned}\Pi_1(p^2) &= g_3^4 \int \frac{d^dq}{(2\pi)^d}\left(\frac{1}{q^2-m^2}\right)^2 \frac{1}{(p-q)^2-m^2}\int \frac{d^dr}{(2\pi)^d}\frac{1}{r^2-m^2}\frac{1}{(q-r)^2-M^2} \\ &=: g_3^4 \int \frac{d^dq}{(2\pi)^d}\left(\frac{1}{q^2-m^2}\right)^2 \frac{1}{(p-q)^2-m^2}P_1.\end{aligned}$$

$$\begin{aligned}P_1 &= \int dx \int \frac{d^dr}{(2\pi)^d}\Big((1-x)(r^2-m^2) + x[(q-r)^2-M^2]\Big)^{-2} \\ &= \int dx \int \frac{d^dr}{(2\pi)^d}\Big((r-xq)^2 - x^2q^2 - (1-x)m^2 + xq^2 - xM^2\Big)^{-2} \\ &= \int_0^1 dx \int \frac{d^dk}{(2\pi)^d}\Big(k^2-\Delta_1\Big)^{-2} \\ &= \frac{i}{(4\pi)^{2-\epsilon}}\Gamma(\epsilon)\int_0^1 dx\,\frac{1}{\Delta_1^\epsilon},\end{aligned}$$

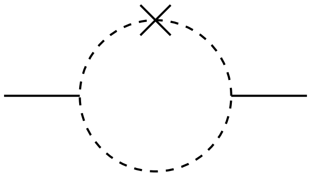
where $l = r - xq$ and $\Delta_1 = -x(1-x)q^2 + (1-x)m^2 + xM^2$.

The integrand can be rewritten as following:

$$\begin{aligned}&\left(\frac{1}{q^2-m^2}\right)^2 \frac{1}{r^2-m^2}\frac{1}{(p-q)^2-m^2}\frac{1}{(q-r)^2-M^2} \\ &= 24\int dF_4\, x\Big(x(q^2-m^2) + y(r^2-m^2) + z[(p-q)^2-m^2] + w[(q-r)^2-M^2]\Big)^{-5}\end{aligned}$$

where $\int dF_4 = \int_0^1 dx\,dy\,dz\,dw\,\delta(x+y+z+w-1)$.

2 Diagram 2



3 Diagram 3