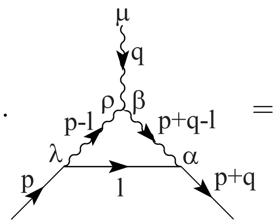
2. 

$$= -ie\Lambda_b^\mu(p, p+q)e^{ip\wedge q} \tag{81}$$

$$\begin{aligned} &= \int \frac{d^4l}{(2\pi)^4} \frac{-ig_{\alpha\beta}}{(p+q-l)^2} \frac{-ig_{\lambda\rho}}{(p-l)^2}(-ie\gamma^\alpha)iS_0(l)(-ie\gamma^\lambda) \\ &\quad \times(2e)\gamma^{\mu\beta\rho}(q, -p-q+l, p-l)\frac{1}{2i}\left(1-e^{2il\wedge q}e^{-2ip\wedge q}\right)e^{ip\wedge q}, \end{aligned}$$

whose planar part logarithimically diverges. In fact its pole part (PP) is given by

$$\mathrm{PP}[-ie\Lambda_b^\mu(p, p+q)] = \frac{3}{16\pi^2}\frac{1}{\epsilon}\gamma^\mu \tag{82}$$

so that, in the minimal dimensional regularization scheme,

$$Z_{1F} = 1 - \frac{3}{16\pi^2}\frac{1}{\epsilon}, \tag{83}$$

which agrees with the result of previous calculation [12]. Contracting q_μ in the expression (81), we get

$$\begin{aligned} q_\mu\Lambda_b^\mu(p, p+q) &= \int \frac{d^4l}{(2\pi)^4} \frac{-ig_{\alpha\beta}}{(p+q-l)^2} \frac{-ig_{\lambda\rho}}{(p-l)^2}(-ie\gamma^\alpha)iS_0(l)(-ie\gamma^\lambda)\left(1-e^{2il\wedge q}e^{-2ip\wedge q}\right) \\ &\quad \times\left\{(p+q-l)^\rho q^\beta + (p-l)^\beta q^\rho - [(p+q-l)\cdot q + (p-l)\cdot q]g^{\beta\rho}\right\}, \end{aligned} \tag{84}$$

which may be further simplified using

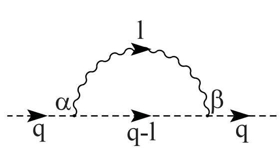
$$\begin{aligned} (p+q-l)^\rho q^\beta + (p-l)^\beta q^\rho &= (p+q-l)^\rho(p+q-l)^\beta - (p-l)^\rho(p-l)^\beta, \text{ and} \\ (p+q-l)\cdot q + (p-l)\cdot q &= (p+q-l)^2 - (p-l)^2, \end{aligned} \tag{85}$$

to yield

$$\begin{aligned} q_\mu\Lambda_b^\mu(p, p+q) &= \Sigma(p) - \Sigma(p+q) - \Sigma_{\mathrm{np}}(p) + \Sigma_{\mathrm{np}}(p+q) \\ &\quad + \int \frac{d^4l}{(2\pi)^4} \frac{i}{(p+q-l)^2} \frac{i}{(p-l)^2}(ie)(\not{p}+\not{q}-\not{l})iS_0(l)(ie)(\not{p}+\not{q}-\not{l})\left(1-e^{2il\wedge q}e^{-2ip\wedge q}\right) \\ &\quad - \int \frac{d^4l}{(2\pi)^4} \frac{i}{(p+q-l)^2} \frac{i}{(p-l)^2}(ie)(\not{p}-\not{l})iS_0(l)(ie)(\not{p}-\not{l})\left(1-e^{2il\wedge q}e^{-2ip\wedge q}\right), \end{aligned} \tag{86}$$

where Σ is similar to Σ_{np} of Eq. (80), but without the phase factor.

For the last term in left-hand side of Eq. (76), we get



$$= iq^2b(q^2) \tag{87}$$