Valentina Montoya

①

1) Definimos que: $\frac{1}{ab} = \int_0^1 \frac{dz}{[az + b(1-z)]^2}$

$b = (k^2 - m_\lambda^2)$ $\quad a = (p+k)^2 - m_s^2$, luego

$az + b(1-z) = ((p+k)^2 - m_s^2)z + (k^2 - m_\lambda^2)(1-z)$

② Cambio variables $k \to k'$

$(p+k)^2 z + k^2(1-z)$ cambiando $k' = k \pm pz$
$k = k' \mp pz$

$(p + k' + pz)^2 z + (k' + pz)^2(1-z)$ $\quad k_1 = k' + pz$
$k_2 = k' - pz$

$(p+k')^2 z + 2pz^2(p+k') + p^2z^3 + (k'^2 + 2k'pz + p^2z^2) - (k'^2 z + 2kp'z^2 + p^2z^3)$

$p^2 z + \cancel{2k'pz} + \cancel{k'^2 z} + 2p^2z^2 + 2p^2 z^2 k' + \cancel{p^2 z^3} + k'^2 + 2k'pz + p^2z^2 - (\cancel{k'^2 z} + \cancel{2k'pz^2} + \cancel{p^2z^3})$

$3p^2z^2 + p^2 z + 2k'pz + k'^2 + 2k'pz$ con ⊕ no da

haciendo la otra solución $k = k' - pz$

$(p + k' - pz)^2 z + (k' - pz)^2(1-z)$

$(p+k')^2 z - 2(p+k')pz^2 + p^2z^3 + k'^2 - 2k'pz + p^2z^2 - z(k'^2 - 2k'pz + p^2z^2)$

$p^2 z + \cancel{2pk'z} + k'^2 z - 2p^2z^2 - 2p^2k'z + k'^2 - \cancel{2k'pz} + p^2z^2 - \cancel{2k'^2} - 2k'pz^2$

mal cálculo!!

$\to p^2 z + 2p(k' \mp pz)z + (k' \mp pz)^2 z + (k' \mp pz)^2 - (k' \mp pz)^2 z$

$\to p^2 z + 2pk'z \mp 2p^2z^2 + k'^2 + p^2z^2 \mp 2pk'z$

(2) $\to (p+k)^2 z - m_s^2 z + k^2(1-z) - m_\lambda^2(1-z)$
$p^2 z - p^2 z^2 + k'^2 \quad - m^2 z - m_\lambda^2(1-z)$

$= k'^2 + p^2(1-z)z - m_s^2 z - m_\lambda^2(1-z)$

$$\to \int \frac{d^d p}{(p^2 + 2pq - m^2)^2} = i\pi^{d/2} \frac{\Gamma(2 - d/2)}{\Gamma(2)} \frac{1}{[-q^2 - m^2]^{2-d/2}}$$

se le conoce como regularización dimensional