

(1) we fixed definition of 'g' $\rightarrow$ fixes 'F'

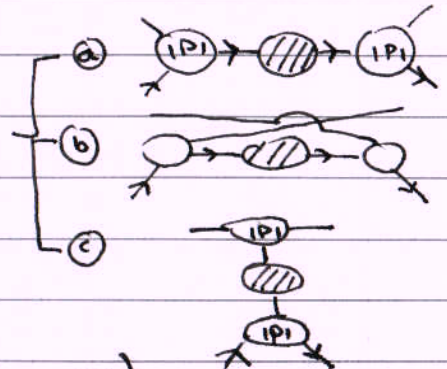
$$\text{Diagram: a circle with a diagonal line through it, labeled IPI, with incoming momentum p and outgoing momentum q} \equiv -i T'(p^2, p'^2, q^2)$$

$g \equiv T'(m^2, m^2, \mu^2) \rightarrow$ only one definition

example $\phi + \psi \rightarrow \phi + \psi$

$$\text{Diagram: a circle with a diagonal line through it} \equiv \text{Diagram: a circle with a diagonal line through it and IPI label} + \text{not IPI}$$

+ not IPI



(a) $i T'(s, m^2, \mu^2) D'(s) (-i T'(m^2, s, \mu^2))$

$$= \frac{i(-ig)^2}{s - m^2} \rightarrow \text{pole at } s = m^2, \text{ Residue} \rightarrow g^2 + \dots$$

(b) and (c) has pole at $u = m^2$ and $t = m^2$.

(2) Renormalization vs. infinities:

A Lagrangian is renormalizable if all the counterterms required to remove infinities from Green's functions are terms of the same type as those present in the original Lagrangian.

(3) Unstable particles

$$D'(k^2) = \frac{i}{k^2 - \mu^2 - \Pi(k^2) - i\epsilon}$$

$$\frac{\Pi(k^2)}{\theta(g^2)} = -\text{Diagram: a circle with a diagonal line through it} + \text{Diagram: a circle with a diagonal line through it and IPI label}$$

Prescription: $\mu > 2m$

$$\text{Re } \Pi(k^2) = 0$$

$$\text{Re } \frac{d\Pi}{dk^2} \Big|_{k^2 = \mu^2} = 0$$

Can have imaginary part $\Pi_I(\mu^2)$ for $\mu^2 > 4m^2$

$$\rightarrow (-i D'(k^2))^{-1} = k^2 - (\mu - i\frac{\Gamma}{2})^2 + \theta(g^4)$$