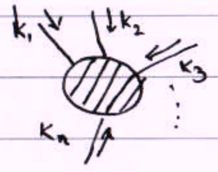
Outline.

Lecture 14

Scattering theory reconsidered

Introduced $\tilde{G}_F^{(n)}(k_1, \ldots k_n)$ which represents all allowed graphs in a theory with n external legs.

Graphically,



$\rightarrow$ Green's function

we show, for example

$$\langle k_1', k_2' | (S-1) | k_1 k_2 \rangle = \prod_{a=1}^{4} \left(-i\,(k_a^2 - \mu^2)\right) \tilde{G}_F^{(4)}(k_1, k_2, -k_1', -k_4')$$

Also, given a $\mathcal{L}$, if we shift it accordingly

$$\mathcal{L} \rightarrow \mathcal{L}_\rho \equiv \mathcal{L} + \rho(x)\,\phi(x)$$

$$Z_F[\rho] \equiv \langle 0 | S | 0 \rangle \Big|_\rho \Rightarrow \frac{\delta^n Z_F[\rho]}{\delta\rho(x_1) \ldots \delta\rho(x_n)} = (i)^n G_F^{(n)}(x_1, \ldots x_n)$$

$\Rightarrow Z_F[\rho]$ is the generating functional for all Green's functions.