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$$G_{s_1, \dots, s_n}^{(n)R}(k_1, \dots, k_n, \vec{g}_R, \mu) = \left\langle \prod_{i=1}^n \tilde{\Phi}(k_i) \right\rangle_{s_i R}$$

$$\left\{ \mu \frac{\partial}{\partial \mu} + \sum_{\alpha} \beta_{\alpha}(\vec{g}_R, \mu) \frac{\partial}{\partial g_{\alpha R}} + \sum_i \gamma_{s_i}(\vec{g}_R, \mu) \right\} G_{s_1, \dots, s_n}^{(n)R} = 0$$

Assume : $\gamma_{st} = \gamma_s \delta_{st}$

$$G_{s_1, \dots, s_n}^{(n)R}(\lambda k_1, \dots, \lambda k_n, \lambda^{\Delta_{\alpha}} g_{\alpha R}, \lambda \mu) = \lambda^{\sum d_{s_i}} \times G_{s_1, \dots, s_n}^{(n)R}(k_1, \dots, k_n, \{g_{\alpha R}\}, \mu)$$

where d_s : dimension of $\tilde{\Phi}_s(k)$

and Δ_{α} : dimension of $g_{\alpha R}$

$$g_{\alpha R} \rightarrow \lambda^{-\Delta_{\alpha}} g_{\alpha} \quad , \quad \mu \rightarrow \lambda^{-1} \mu$$

$$G_{s_1, \dots, s_n}^{(n)R}(\lambda k_1, \dots, \lambda k_n, \{g_{\alpha R}\}, \mu) = \lambda^{\sum_{i=1}^n d_{s_i}} G_{s_1, \dots, s_n}^{(n)R}(k_1, \dots, k_n, \{\lambda^{-\Delta_{\alpha}} g_{\alpha}\}, \lambda^{-1} \mu)$$

we get,

$$\lambda \frac{\partial G_{s_1, \dots, s_n}^{(n)R}(\lambda k_1, \dots, \lambda k_n, \{g_{\alpha R}\}, \mu)}{\partial \lambda}$$

$$= \left(\sum_{i=1}^n d_{s_i} - \sum_{\alpha} \Delta_{\alpha} g_{\alpha R} \frac{\partial}{\partial g_{\alpha R}} - \mu \frac{\partial}{\partial \mu} \right) G_{s_1, \dots, s_n}^{(n)R}(\lambda k_1, \dots, \lambda k_n, \{g_{\alpha R}\}, \mu)$$

$$G_{s_1, \dots, s_n}^{(n)R}(\lambda k_1, \dots, \lambda k_n, \{g_{\alpha R}\}, \mu)$$

$$\lambda \frac{\partial}{\partial \lambda} G_{s_1 \dots s_n}^{(NR)}(\lambda k_1, \dots, \lambda k_n, \{g_{\alpha R}\}, \mu)$$

$$= \left(\sum_{i=1}^n d_{s_i} - \sum_{\alpha} \Delta_{\alpha} g_{\alpha R} \frac{\partial}{\partial g_{\alpha R}} - \mu \frac{\partial}{\partial \mu} \right) G_{s_1 \dots s_n}^{(NR)}(\lambda k_1, \dots, \lambda k_n; \{g_{\alpha R}\}, \mu) \quad \text{--- (A)}$$

$$= \left[\sum_{i=1}^n \left\{ d_{s_i} + \gamma_{s_i}(\vec{p}_R, \mu) \right\} + \sum_{\alpha} \left\{ \beta_{\alpha}(\vec{p}_R, \mu) - \Delta_{\alpha} g_{\alpha R} \right\} \times \frac{\partial}{\partial g_{\alpha R}} \right]$$

$$\times G_{s_1 \dots s_n}^{(NR)}(\lambda k_1, \dots, \lambda k_n; \{g_{\alpha R}\}, \mu) \quad \text{--- (B)}$$

eqn. where there is no μ -derivative tells us how the Green's fn. scale out the momenta when we scale the momenta.

→ But why is this possible? → Becs by dimensional analysis, we can transfer the change in momenta to other quantities

Suppose there was no need to renormalise the theory. In this case $\beta_{\alpha} = 0, \gamma_s = 0$

The renorm. parameters fields can be taken to be equal to non-renorm. parameters/fields

$$\lambda \frac{\partial}{\partial \lambda} G_{s_1 \dots s_n}^{(NR)}(\lambda k_1, \dots, \lambda k_n, \{g_{\alpha R}\})$$

$$= \left(\sum_{i=1}^n d_{s_i} - \sum_{\alpha} \Delta_{\alpha} g_{\alpha R} \frac{\partial}{\partial g_{\alpha R}} \right) G_{s_1 \dots s_n}^{(NR)}(\lambda k_1, \dots, \lambda k_n; \{g_{\alpha R}\})$$

(This ^{eqn} should reflect the dimensional analysis)

