Title: QFT III Lecture

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$\phi_1(x_1)\dots\phi_n(x_n)$

$$\langle X\rangle = \frac{1}{Z}\int[d\Phi]\, X\, \exp(-S) \,,$$

[Conformal symmetry on

$$\phi \longrightarrow \tilde{\Phi}(x) = \phi(x) - i\omega(x)\, G\phi$$

$$\langle X\rangle = \frac{1}{Z}\int[d\tilde{\Phi}]\,(X+\delta X)\,\exp\left(-S[\phi]+\int d^dx\, \omega(x)\,\partial_\mu j^\mu(x)\right)$$

expanding in $\omega \ll 1$

$[d\tilde{\Phi}]=[d\phi$

Coeff. $\int d^dx$

$$0=\sum_{i=1}^{n} G_i\langle X\rangle \longleftarrow \langle j^\mu X\rangle \to 0, \quad x\to\infty$$

$$\boxed{\frac{\partial}{\partial x^\mu}\langle j^\mu(x)\, X\rangle = -i\sum_{i=1}^{n} \delta(x-x_i)\, G_i\langle X\rangle}$$

y on quantum level $\rightsquigarrow$ Ward identities.

$$\int \omega(x)\, f(x)\, d^dx = 0 \ \forall \omega \Leftrightarrow f(x) = 0$$

xpanding in $\omega \ll 1$

$[d\tilde{\Phi}] = [d\Phi]$

$$-i \sum_{i=1}^{n} \omega_a(x_i)\, G_i \cdot \langle X \rangle = \int d^dx\, \omega(x)\, \partial_\mu \langle j^\mu(x) X \rangle$$

$$\|$$

$$-i \int d^dx\, \omega(x) \sum_{i=1}^{n} \delta(x - x_i)\, G_i \langle X \rangle$$

$\langle X \rangle$