

Feynman Rules

Contractions

$$\overline{\phi(x)\phi(y)} \equiv \langle T(\phi(x)\phi(y)) \rangle \cdot \underline{1}$$

$$\underbrace{\phi(x)\phi(y)} \equiv \langle \phi(x)\phi(y) \rangle \cdot \underline{1}$$

$$\underbrace{\phi(x)Q^\dagger(k)} \equiv \langle 0|\phi(x)Q^\dagger(k)|0\rangle \equiv \langle x|k\rangle = e^{-ikx}$$

$$\underbrace{Q(k)\phi(x)} \equiv \langle 0|Q(k)\phi(x)|0\rangle \equiv \langle k|x\rangle = e^{ikx}$$

Wick 1

$$T(\phi(x_1) \dots \phi(x_N)) = \overline{\sum_{\substack{\text{All} \\ \sqcap \text{ contractions}}} : \phi(x_1) \dots \phi(x_N) :}$$

Wick 3

$$\left(: X_A : \right) \left(: X_B : \right) \left(: X_C : \right)$$

$$X = \phi_1 \dots \phi_{n_x}$$

$$= \overline{\sum_{\substack{\text{All extra con} \\ \sqsubset \text{ contractions}}} : X_A X_B X_C :}$$

