

A Feynman diagram representing a bubble with four external lines. The external lines are labeled p_1 (top-left), p_2 (bottom-left), p_3 (top-right), and p_4 (bottom-right). The bubble is formed by two concentric circles. The diagram is labeled (1) on the right.

QFT 中用西海岸度规 $(1,-1)$

Feynman Rule of Sclar Field

费曼规则解决 $S_{fi} = \langle f|S|i\rangle \sim \langle \Omega|T\{\phi(x_1)\cdots \phi(x_n)\}|\rangle$ 后面式子的计算, $|\Omega\rangle$ 是相互作用理论的基态/真空, $|0\rangle$ 是自由理论的基态.

$$D_F(x,y)\equiv \langle 0|T\{\phi_0(x)\phi_0(y)\}\rangle = \int \frac{\mathrm{d}^4k}{(2\pi)^4} \frac{\mathrm{i}}{k^2-m^2+\mathrm{i}\epsilon} \mathrm{e}^{\mathrm{i}k(x-y)} \tag{2}$$

以 $\mathcal{L}_{\text{int}} = -\frac{\lambda}{4!}\phi^4$ 理论为例