

QFT Home Assignment # 2. Submission date 28.11.2010

1. Consider the Lagrangian density

$$L = \frac{1}{2} (\partial_\mu \phi)^2 - \frac{1}{2} m^2 \phi^2 - \frac{\lambda}{4!} \phi^4 \quad (1)$$

Draw all possible connected Feynman diagrams up to the order λ^3 contributing to (a) the two-point correlator, (b) the three-point correlator, (c) the four-point correlator. Find the symmetry factors for all the graphs. Restore \hbar and find the relation between \hbar and loop expansions.

2. Consider the Lagrangian density

$$L = \frac{1}{2} (\partial_\mu \phi)^2 - \frac{1}{2} m^2 \phi^2 - \frac{\lambda}{3!} \phi^3 \quad (2)$$

Draw all possible connected Feynman diagrams contributing to (a) the two-point correlator (up to the order λ^4), (b) the three-point correlator (up to the order λ^3). Find the symmetry factors for all the graphs. Restore \hbar and find the relation between \hbar and loop expansions.

3. Peskin and Schroeder: Problem 9.2.