

## Exercices and questions for lectures 6 & 7

§ 1.- Work out all possible contractions and draw the corresponding Feynman diagrams for the  $2 \rightarrow 2$  process in  $\frac{\lambda}{4!}\phi^4$  theory.

§ 2.- Combinatorics in  $\frac{\lambda}{4!}\phi^4$ : To get some practice, determine the symmetry factor of the “rising sun” diagram.

§ 3.- Write a simple Feynman diagram with an internal fermionic line and convince yourself that Furry’s theorem is correct.

4.- Draw (but do not attempt to compute) all possible Feynman diagrams for the  $e^+e^- \rightarrow e^+e^-$  process in QED at the next order in perturbation theory.

5.- Write the amplitude ( $S$ -matrix element) for the photoproduction process  $e^+e^- \rightarrow \gamma\gamma$ .