

SCPY639 Quantum Field Theory  
Problem Set # 2. Due date: October 12, 2022

1. Calculate the averaged amplitude square of pair annihilation  $\phi\phi^* \rightarrow \gamma\gamma$  in scalar QED, use all possible tree diagrams.
2. Verify Furry theorem from t-channel Compton scattering tree diagrams in spinor QED, with internal electron line and positron line. (Show the equality of their amplitudes.)
3. Calculate the averaged amplitude squared of Mott scattering  $e^-e^- \rightarrow e^-e^-$  in spinor QED in ultrarelativistic limit, use all possible tree diagrams.

Hint: Use FeynCalc to calculate trace of gamma matrix and 4-vector contraction.