

Homework Set #6

Due Date: 5pm February 28th

1) $e^+e^- \rightarrow \mu^+\mu^-$ scattering

(10 points)

We calculated $\frac{d\sigma}{d\Omega}$ for $e^+e^- \rightarrow \mu^+\mu^-$ scattering in class using linear (x & y) polarizations. Repeat the calculation using circular polarization.

2) $\gamma e \rightarrow \gamma e$ scattering

(5 points)

- a) Draw all the leading order diagrams for $\gamma e \rightarrow \gamma e$. Label the momenta of the ingoing and outgoing particles and the internal propagators.
- b) What power of the coupling constant is each graph proportional to?
- c) What power of the coupling constant would the cross section be proportional to?
- d) Second order diagrams contain loops of particles within them. Draw the diagrams associated with the second order correction to $\gamma e \rightarrow \gamma e$. Only consider γ and e internal lines.
- e) What power of the coupling constant is each of the second order diagrams proportional to ?