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 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 ?