

# PHYC 542: Particle Physics I

Fall 2017

## Homework Assignment #4

(Due November 10, 2017)

1- Exercise 6.4 of Halzen and Martin.

2- Exercise 6.6 of Halzen and Martin.

3- Exercise 6.8 of Halzen and Martin.

4- The most general form for the photon propagator in the Lorenz gauge is

$$\frac{i}{q^2} \left( -g_{\mu\nu} + (1 - \xi) \frac{q_\mu q_\nu}{q^2} \right),$$

where  $\xi = 1$  in the Feynman gauge. As pointed out in exercise 6.14 of Halzen and Martin, the extra term when  $\xi \neq 1$  vanishes in QED calculations in which the virtual photon is coupled to conserved currents. Explicitly verify this in the case of Moller and Bhabha scatterings (at the lowest order).