

chapter 6

Chenxi Gu
2017311017

June 4, 2018

1 6.1

- spin : 1
- three quarks exist for every flavour
- 8 kinds of gluons

2 6.2

When $\sqrt{s} = 2.5$ R=2, $\sqrt{s} = 4$ $R = \frac{10}{3}$

3 6.3

(a)

$$\frac{pT}{p} = \frac{1}{\sqrt{s}} = 0.223607 \quad (1)$$

(b)

$$\frac{d\sigma}{d\Omega} \propto (1 + \cos^2(\theta)) \quad (2)$$

So the rate is $\frac{4}{7}$

4 6.4

We use formula:

$$x = \frac{Q^2}{2\nu m_p} \quad (3)$$

$$E' = 33.37 GeV$$

5 6.5

$$\begin{aligned}
 x &= \frac{Q^2}{2(E - E')m_p} \\
 E &= E' + \frac{EE'}{m_p}(1 - \cos\theta) \\
 Q^2 &= 2EE'1 - (\cos\theta)
 \end{aligned} \tag{4}$$

So $x = 1$, for the elastic scattering.

6 6.8

$$\begin{aligned}
 Q^2 &= 2xm_p(E - \frac{Q^2}{2E(1 - \cos\theta)}) \\
 Q^2 &= \frac{2E^2(1 - \cos\theta)}{1 + \frac{E}{xm_p}(1 - \cos\theta)}
 \end{aligned} \tag{5}$$

When $\theta = \pi$, Q^2 is maximum. $Q^2 = 37.48 GeV^2$