Chapter 8

Conclusion

The bottom quark production in the single diffraction has been first observed in $p\bar{p}$ collisions at $\sqrt{s}$=1.8 TeV using the forward rapidity gap method. The high-p_T electron in the central rapidity region ($|\eta|$ <1.1) is used to identify the decay of the produced bottom quark. The ratio of the diffractive to the non-diffractive bottom quark production is obtained using the model dependent acceptance for the rapidity gap signal. For the four kinds of the pomeron model, the ratio is measured to be;

$$R_{b\bar{b}}(\xi < 0.1; \mathrm{FG}) = 0.62 \pm 0.19(stat) \pm 0.14(syst)\%$$
$$for\ the\ flat - gluon\ pomeron\ model,$$
$$R_{b\bar{b}}(\xi < 0.1; \mathrm{FQ}) = 0.93 \pm 0.29(stat) \pm 0.22(syst)\%$$
$$for\ the\ flat - quark\ pomeron\ model,$$
$$R_{b\bar{b}}(\xi < 0.1; \mathrm{HG}) = 0.71 \pm 0.22(stat) \pm 0.16(syst)\%$$
$$for\ the\ hard - gluon\ pomeron\ model,$$
$$R_{b\bar{b}}(\xi < 0.1; \mathrm{HQ}) = 1.18 \pm 0.36(stat) \pm 0.27(syst)\%$$
$$for\ the\ hard - quark\ pomeron,$$

where electron from bottom quark is observed in the kinematic region of 9.5 $< E_T^{ele} <$ 20 GeV and $|\eta^{ele}| <$ 1.1.

The measured ratio is compared to the results of the diffractive W and

the diffractive dijet productions. Results of the three measurements are consistent with each other. The results yields the gluon fraction of $f_g \sim 0.5$, and the flux discrepancy factor of $D \sim 0.2$. The large deviation of D from 1 suggests that there is a problem in the hypothesis of the factorization of the pomeron flux [42].