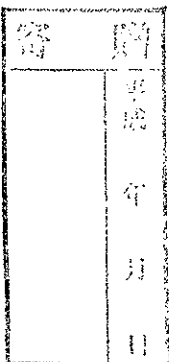


**Observation of Diffractive Bottom Quark  
Production  
in 1.8-TeV Proton-Antiproton Collisions**

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## Abstract

The bottom quark production in the single diffractive dissociation is first observed in  $p\bar{p}$  collisions at  $\sqrt{s}=1.8$  TeV using the Collider Detector at Fermilab. The absence of an energy flow in the forward rapidity region ('rapidity gap') is used as an evidence of the single diffraction. The high- $p_T$  electron in the  $E_T$  range of  $9.5 < E_T^{ele} < 20$  GeV and the central rapidity region ( $|\eta| < 1.1$ ) are used to identify the bottom quark decay. The ratio of the diffractive to the non-diffractive bottom quark production is obtained using the model dependent acceptance of the rapidity gap signal for the four kinds of the pomeron model. The ratio  $R_{b\bar{b}}$  is measured to be;

$$R_{b\bar{b}}(\xi < 0.1; \text{FG}) = 0.62 \pm 0.19(\text{stat}) \pm 0.14(\text{syst})\%$$

for the flat-gluon pomeron model,

$$R_{b\bar{b}}(\xi < 0.1; \text{FQ}) = 0.93 \pm 0.29(\text{stat}) \pm 0.22(\text{syst})\%$$

for the flat-quark pomeron model,

$$R_{b\bar{b}}(\xi < 0.1; \text{HG}) = 0.71 \pm 0.22(\text{stat}) \pm 0.16(\text{syst})\%$$

for the hard-gluon pomeron model,

$$R_{b\bar{b}}(\xi < 0.1; \text{HQ}) = 1.18 \pm 0.36(\text{stat}) \pm 0.27(\text{syst})\%$$

for the hard-quark pomeron model.

This measured ratio is compared with the results of the diffractive  $W$  and the diffractive dijet productions. The ratios measured in these three processes are consistent with each other and significantly lower than the theoretical prediction.

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