

THE CHARGE ASYMMETRY IN W BOSONS PRODUCED IN $p\bar{p}$
COLLISIONS AT $\sqrt{s} = 1.96$ TeV

Abstract

by

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The primary mode of production of W^+ bosons in a $p\bar{p}$ collider is $u + \bar{d} \rightarrow W^+$. The u quark generally carries more momentum than the \bar{d} and the resultant W^+ tends to be boosted in the proton direction. Similarly, W^- bosons are boosted in the anti-proton direction. This is observed as an asymmetry in the rapidity distributions of positive and negative W bosons. Measurement of this asymmetry serves as a probe of the momentum distribution of partons within the proton. These distributions are required as input to the calculation of every $p\bar{p}$ production cross section.

This thesis presents the first measurement at DØ of the charge asymmetry of the W boson production cross section as measured in $W \rightarrow e\nu$ decays in 0.3 fb^{-1} of $p\bar{p}$ collisions collected with the DØ Detector. Theoretical predictions made using the CTEQ6.1M and MRST(2004) parton distribution functions are compared with the measurement.