Physics of Proton-Antiproton Collisions at Tevatron CDF

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Abstract

The Collider Detector at Fermilab (CDF) collaboration performs an experiment at the Tevatron proton-antiproton collider at Fermilab in Batavia, Illinois, USA, using proton-antiproton collisions at a center-of-mass energy of $\sqrt{s} = 1.8$ TeV.

Since its inception in 1985, CDF has studied various aspects of elementary particle physics, such as quantum chromodynamics (QCD), electroweak physics, heavy quarks, and searches for new phenomena beyond the standard model of elementary particles.

Most recently, CDF collected a data sample corresponding to an integrated luminosity of 110 pb^{-1} during the period from 1992 to 1996 (Run I). CDF has observed production of top quark pairs in this data sample. CDF has also studied various hard QCD processes such as production of (a) high transverse momentum jets, (b) $W^{\pm}$ bosons, (c) lepton pairs through the Drell-Yan mechanism and Z^0 boson decay, and (d) heavy quarks both in open and hidden (quarkonium) forms.

After a brief introduction to the experiment and the particle detection with the CDF detector, we discuss some of these QCD processes and relevant CDF measurements. Finally, we mention B-physics results from Run-I data and prospects in the next data taking period Run II, which is scheduled to begin in spring 2001 and collect about 2 fb^{-1} of data in its first two years of operation.

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