

# Central exclusive $\pi^+\pi^-$ production in $p\bar{p}$ collisions at $\sqrt{s} = 0.9$ and 1.96 TeV at the Tevatron

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## Collaboration

CDF

## Abstract content

Exclusive central hadronic systems from hadron collisions result primarily from double pomeron exchange, and these have very restrictive quantum numbers:  $I^G J^{PC} = 0^+(\text{even})^{++}$ . This “quantum number filter” is a powerful tool for meson spectroscopy in the isoscalar sector, especially for glue-rich states. In addition it provides information on the nature of the pomeron. We have measured exclusive  $\pi^+\pi^-$  production in proton-antiproton collisions at  $\sqrt{s} = 0.9$  and 1.96 TeV in the Collider Detector at Fermilab. We selected events with exactly two oppositely charged particles, assumed to be pions, in  $|\eta| < 1.3$  with no other particles detected in  $|\eta| < 5.9$ . The central  $\pi^+\pi^-$  was required to have rapidity  $|y| < 1$ . By requiring no other charged particles, these events are dominated by double pomeron exchange, which constrains the quantum numbers of the central state. The data extend up to  $M(\pi^+\pi^-) = 5 \text{ GeV}/c^2$ , and show resonance structures attributed to the  $f_0$  and  $f_2$  mesons. We place upper limits on exclusive  $\chi_{c0} \rightarrow \pi^+\pi^-$  and  $\chi_{c0} \rightarrow K^+K^-$ . The data is valuable for light hadron spectroscopy, and understanding the pomeron in a region of transition between non-perturbative and perturbative QCD.

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