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# 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: $I^G J^{PC} = 0^+(even)^{++}$. 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 $M(\pi^+\pi^-) = 5$ GeV/$c^2$, and show resonance structures attributed to the $f_0$ and $f_2$ mesons. We place upper limits on exclusive $\chi_{c0} \to \pi^+\pi^-$ and $\chi_{c0} \to K^+K^-$. 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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