Exclusive Central Meson Production in Proton Antiproton Collisions at the Tevatron

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It has been known since the days of the Intersecting Storage Rings, ISR, at CERN, that one can have pp interaction with more than one pomeron, $\mathbb{P}$, exchanged, known as double pomeron exchange. Exclusive hadronic systems, produced by double pomeron exchange, D$\mathbb{P}$E, have the potential of opening a rich new window on hadron spectroscopy and diffraction mechanism.

We have studied events of the type $p + \bar{p} \to p + X + \bar{p}$ where X is a hadron pair (mostly $\pi^+\pi^-$) at $\sqrt{s} = 900$ GeV and 1960 GeV in the Collider Detector at Fermilab (CDF). The hadron pair is central, $\eta \approx 0$, and between two rapidity gaps $\Delta\eta \approx 4$. The dominant process is double pomeron exchange, D$\mathbb{P}$E, with restrictions on the quantum numbers of X: Q = S = 0, C = +1, J = 0 or 2. The mass spectra, with about 500K candidate events assumed to be $\pi^+\pi^-$, shows strong resonant structures attributed to f_0 and f_2 states; their features change with $p_T(\pi^+\pi^-)$. We give the ratio of cross sections at $\sqrt{s} = 900$ GeV and 1960 GeV, and compare with Regge expectations. We estimate the background of K^+K^- events. After selecting high p_T pions we analyze central exclusive production of χ_c.

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