Abstract

We present a measurement of the time-dependent $B^0\overline{B}^0$ mixing using dilepton events in $p\overline{p}$ collisions, which were collected with the CDF detector during 1992-95. We use the $\ell^- D^{*+}$ combinations in dilepton events to obtain a pure $\overline{B}^0$ sample. The $\overline{B}^0$ meson is reconstructed with its semileptonic decay $\overline{B}^0 \to \ell^- \overline{\nu} D^{*+} X$. In order to reconstruct the D^{*+} meson, we use its decay to $D^0\pi^+$. A D^0 candidate is reconstructed with its decay to $K^-\pi^+$, $K^-\pi^+\pi^+\pi^-$ or $K^-\pi^+\pi^0$. Then the D^0 candidate is combined with a pion candidate to form a D^{*+} candidate. We have found 888 events in the signal region in total. The B decay vertex is reconstructed from the lepton and D^{*+} tracks and is used to estimate the proper decay time. The decay flavor of the $\overline{B}^0$ is identified by the sign of the final state. Namely $\ell^- D^{*+}$ for $\overline{B}^0$ and $\ell^+ D^{*-}$ for B^0. The flavor at production is inferred from the charge of the second lepton in the event. Therefore an opposite-sign lepton pair tags an unmixed event and a same-sign lepton pair tags a mixed event. We use an unbinned maximum likelihood fit to extract the oscillation frequency Δm_d and fit the opposite-sign events and the same-sign events simultaneously.

The oscillation frequency Δm_d is measured to be $\Delta m_d = 0.512\ ^{+0.095}_{-0.093}$ (stat) $^{+0.031}_{-0.038}$ (syst) ps^{-1}. It is consistent with the current world average of 0.474 ps^{-1}.