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Precision measurements of Direct CP violation and D0-D0bar mixing at CDF

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The CDF experiment has previously reported evidence for D0-D0bar mixing with a significance equivalent to 3.8 standard deviations based on the time-dependent ratio of the decay rates for D0 −> Kˆ+piˆ- and D0 −>Kˆ-piˆ+, and charge-conjugates. That measurement was based on an integrated luminosity of 1.5 fb-1 and achieved sensitivities of +-0.35*10-3 and +-7.6*10-3 on the mixing parameters x'ˆ2 and y', respectively. Here we report an updated measurement using the same technique. In addition, we present an analysis that measures CP-violating asymmetries in D*-tagged D0−>piˆ+piˆ- decays, where any enhancement from the standard model prediction (of the order of 10-3) would be unambiguous evidence for New Physics. A technique combining asymmetries of piˆ+piˆ-, and Kˆ-piˆ+ D0 decays highly suppresses systematic uncertainties due to detector charge-asymmetric efficiencies allowing a measurement limited only by statistical uncertainties. Both measurements are based on a sample corresponding to an integrated luminosity of 5.2 fb-1.

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