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D0-D0bar Mixing and CP Asymmetry Measurements at BABAR

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We report on D0 mixing and searches for CP violation in charm meson decays using the large sample of charm anti-charm produced in e+e- annihilation data collected with the BaBar detector at the PEP-II asymmetric-energy B Factory near a center-of-mass energy of 10.58 GeV. A direct measurement of D0-D0bar mixing parameters through a time-dependent amplitude analysis of the Dalitz plots of $D^0 \rightarrow K^*_S \pi^+ \pi^-$ and, for the first time, $D^0 \rightarrow K^*_S K^+ K^-$ decays is reported. We measure the mixing parameters x and y and provide the best measurement to date of x . We also report on a search for CP violation in the decay $D^+ \rightarrow K^*_S \pi^+$. In the Standard Model, direct CP violation in charm meson decays is predicted to occur at the level of 10^{-3} or below. In the decay $D^+ \rightarrow K^*_S \pi^+$, a direct CP asymmetry, at the level of 0.33%, is expected from $K^0/\text{anti}\{K\}^0$ mixing in the final state with any asymmetry significantly different than that being a signature for new physics. In addition, we report on a search for CP violation in Cabibbo suppressed $D^+ \rightarrow K^0_s K^+ \pi^+$ decays and allowed $D_s^+ \rightarrow K^0_s K^+ \pi^+$ decays which is signaled by the difference between the T-odd asymmetries, obtained using triple product correlations, measured for $D(s)^+$ and $D(s)^-$ decays.

Primary author: BABAR, Collaboration (SLAC)**Presenter:** BELLIS, Matthew (Stanford University)**Session Classification:** 06 - CP violation, CKM and Rare Decays**Track Classification:** 06 - CP violation, CKM and Rare Decays