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Charmless B decays and CP violation at BABAR

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We report a measurement of CP violation in the decay $B^0 \rightarrow \pi^+ \pi^- \pi^0$ using the full Upsilon(4S) sample of the BABAR experiment. We perform a full time-dependent Dalitz-plot analysis sensitive to the interference between B^0 and B^0 decays, as well as between the intermediate $\rho \rightarrow \pi \pi$ resonances. This allows us to extract the CKM unitarity-triangle angle α with reduced ambiguity and improved precision. Precise measurement of α serves to test the standard model and constrain new physics in B^0 - B^0 mixing.

We search for decays of the B^0 meson to the final states $\omega \omega$ and $\omega \phi$. These flavor-changing-neutral-current decays are sensitive to physics beyond the standard model and thus provide constraints on potential new-physics effects. They may also shed light on the unexpectedly low longitudinal-polarization fraction in the SU(3)-related decay $B \rightarrow K^* \phi$.

We report studies of B-meson decays to the $K\rho$ and Kf_0 final states, where the K and ρ may be charged or neutral. We distinguish between the vector $K(892)$, the tensor $K^*_2(1430)$, and the resonant and nonresonant scalar components. We report first observation or first evidence for some of the modes and analyze the polarization of the vector-vector and vector-tensor components for the observed signals.

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