

First direct observation of time reversal violation in the B system and new CPV results from BABAR

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While CP violation in the B-meson system has been well established by the B factories, there has been no direct observation of time-reversal violation in this system. Furthermore, previous T-violation measurements in other systems are typically not able to distinguish between T and CP violation. Using 468 million B-Bbar pairs collected by the BABAR detector at SLAC, we directly measure T-violating parameters in the time evolution of neutral-B mesons by comparing the probabilities of B₀ or anti-B₀ transforming into definite CP final states and vice versa. The results lead to the first direct, high-significance observation of Time Reversal non-invariance, independent of CP violation. We also present new and precise measurements of the CKM angle alpha and the CP-violation parameter $|q/p|$.

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