

**Measurement of the Neutral B Meson-B Bar Meson Oscillation Frequency
Using Dilepton Events at BABAR**

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UNIVERSITY OF CALIFORNIA
IRVINE

MEASUREMENT OF THE $B^0\bar{B}^0$ OSCILLATION
FREQUENCY USING DILEPTON EVENTS AT *BaBar*

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Physics

by

Ming Chao

Dissertation Committee:
Professor Andrew Lankford, Chair
Professor Myron Bander
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ABSTRACT OF THE DISSERTATION

Measurement of the $B^0\bar{B}^0$ Oscillation Frequency Using Dilepton Events at BABAR

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This dissertation describes the measurement of the $B^0\bar{B}^0$ oscillation frequency Δm_d with a sample of 122×10^6 $B\bar{B}$ pairs collected with the BABAR detector at the PEP-II asymmetric B Factory at the Stanford Linear Accelerator Center. A fully inclusive approach is used to select dilepton events in which B meson decays semileptonically and the lepton's charge is employed to identify the flavor of each B meson. The oscillation frequency Δm_d is extracted from the the time evolution of the dilepton events. A maximum likelihood fit to the same sign and opposite sign events simultaneously gives:

$$\Delta m_d = (0.485 \pm 0.009(\text{stat.}) \pm 0.010(\text{syst.})) \text{ ps}^{-1}$$

where the first uncertainty is statistical and the second is systematic. This is one of the single most precise measurements of the $B^0\bar{B}^0$ oscillation frequency to date.