

**Measurement of the $B^0 \rightarrow \Psi(2S) \Lambda^0$ Branching
Fraction on BaBar at the Stanford Linear Accelerator
Center**

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Ph.D. Thesis

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The decays of B^0 mesons to hadronic final states remains a rich area of physics on BaBar. Not only do the $c\bar{c}$ -K final states (e.g. $B^0 \rightarrow \psi(2S)K^0$) allow for the measurement of CP Violation, but the branching fractions provide a sensitive test of the theoretical methods used to account for low energy non-perturbative QCD effects.

We present the measurement of the branching fraction for the decay $B^0 \rightarrow \psi(2S)K_s$. The data set consists of $88.8 \pm 1.0 \times 10^6$ $B\bar{B}$ pairs collected on the $e^+e^- \rightarrow \Upsilon(4S)$ resonance on BaBar/PEP-II at the Stanford Linear Accelerator Center (SLAC). This analysis features a modification of present cuts, with respect to those published so far on BaBar, on the $K_s \rightarrow \pi^+\pi^-$ and $\psi(2S) \rightarrow J/\psi\pi^+\pi^-$ which aim at reducing the background while keeping the signal intact. Various data selection criteria are studied for the lepton modes (e^+e^- and $\mu^+\mu^-$) of the J/ψ and $\psi(2S)$ to improve signal purity as well as study the stability of the resultant branching fractions.

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