Measurement of the $B_0 \rightarrow \Psi(2S)\Lambda_0$ Branching Fraction on BaBar at the Stanford Linear Accelerator Center

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Thesis directed by Professor Uriel Nauenberg

The decays of $B^0$ mesons to hadronic final states remains a rich area of physics on BaBar. Not only do the $\phi-K$ final states (e.g. $B^0 \to \psi(2S)K^0$) 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 $B^0 \to \psi(2S)K_s$. The data set consists of $68.8 \pm 1.0 \times 10^6 B\bar{B}$ pairs collected on the $e^+e^- \to \Upsilon(4S)$ 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 $K_s \to \pi^+\pi^-$ and $\psi(2S) \to J/\psi\pi^+\pi^-$ 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 $J/\psi$ and $\psi(2S)$ to improve signal purity as well as study the stability of the resultant branching fractions.
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