SLAC-R-786

Measurement of the B0 ---> Psi (2S) Lambda0 Branching Fraction on BaBar at the Stanford Linear Accelerator Center

by Alexander Raymond Olivas, Jr.

Ph.D. Thesis

Stanford Linear Accelerator Center, Stanford University, Stanford, CA 94309

Work supported by Department of Energy contract DE–AC02–76SF00515.

Olivas, Jr., Alexander Raymond (Ph. D., Physics)

Measurement of the $B^0 \to \psi(2S)K^0$ Branching Fraction on BaBar at the Stanford Linear Accelerator Center.

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 $c\bar{c}$-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 $88.8 \pm 1.0 \times 10^6$ $B\bar{B}$ 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/ψ and $\psi(2S)$ to improve signal purity as well as study the stability of the resultant branching fractions.

Contents