

**The Measurement of CP Asymmetries And Branching
Fractions in Neutral B Meson Decays to Charged Rhos
And Pions (Kaons) With the BaBar Detector**

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Ph.D. Thesis

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by

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Abstract

We present measurements of branching ratios and CP -violating asymmetries for neutral B decays into quasi two-body final states dominated by the modes $\rho^\pm \pi^\mp$ and $\rho^\pm K^\mp$. The data set used for these measurements was recorded during the 1999-2002 period, and corresponds to a total integrated luminosity of 81.9 fb^{-1} taken on the $\Upsilon(4S)$ peak, and 9.5 fb^{-1} taken 40 MeV off-peak. From a time-dependent maximum likelihood fit we find for the branching fractions

$$\begin{aligned} \mathcal{B}(\rho^\pm \pi^\mp) &= (22.6 \pm 1.8 (\text{stat}) \pm 2.2 (\text{syst})) \times 10^{-6} , \\ \mathcal{B}(\rho^\pm K^\mp) &= (7.3^{+1.3}_{-1.2} (\text{stat}) \pm 1.3 (\text{syst})) \times 10^{-6} . \end{aligned}$$

For the CP violation parameters, we measure:

$$\begin{aligned} A_{CP}^{\rho K} &= 0.28 \pm 0.17 (\text{stat}) \pm 0.080 (\text{syst}) , & A_{CP}^{\rho\pi} &= -0.18 \pm 0.48 (\text{stat}) \pm 0.029 (\text{syst}) , \\ C_{\rho\pi} &= 0.36 \pm 0.18 (\text{stat}) \pm 0.041 (\text{syst}) , & S_{\rho\pi} &= 0.19 \pm 0.24 (\text{stat}) \pm 0.031 (\text{syst}) , \end{aligned}$$

and for the remaining parameters, required to fully describe the time dependence of the $B^0(\bar{B}^0) \rightarrow \rho^\pm \pi^\mp$ decays, we obtain

$$\Delta C_{\rho\pi} = 0.28^{+0.18}_{-0.19} (\text{stat}) \pm 0.043 (\text{syst}) , \quad \Delta S_{\rho\pi} = 0.15 \pm 0.25 (\text{stat}) \pm 0.025 (\text{syst}) .$$

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