Investigation of the Charmless Decay $B^{\pm} \rightarrow K^{\pm}\pi^{\pm}\pi^{\mp}$ using a Dalitz Plot analysis at *BABAR*

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Abstract

The *BABAR* experiment operating at the PEP-II e^+e^- collider is designed to study CP violation effects in the B-meson system. The data sample collected between May 1999 and July 2004 consists of 231.8 million $B\overline{B}$ pairs. This data is used to study the decays $B^- \to K^-\pi^-\pi^+$ and $B^+ \to K^+\pi^+\pi^-$. A Dalitz-plot analysis is used to examine the resonant and non-resonant contributions to these three-body decays. A discussion of the fitting technique used and the alternative genetic algorithm procedure is given. Measurements, including full statistical and systematic errors, for the fit fractions and phases are provided for the following components:

- $K^{*0}(892)\pi^{\pm}$
- $K_0^{*0}(1430)\pi^{\pm}$
- $\rho^0(770)K^{\pm}$
- $f_0(980)K^{\pm}$
- $\chi_{c0}\ K^{\pm}$
- non-resonant $K^{\pm}\pi^{\pm}\pi^{\mp}$

Upper limits are set for the fit fractions of additional higher resonances that are found to have small contributions to the Dalitz plots. The inclusive branching fractions are measured as $(64.1 \pm 3.5 \pm 4.5) \times 10^{-6}$ for $B^- \to K^-\pi^-\pi^+$and $(64.7 \pm 3.5 \pm 4.6) \times 10^{-6}$ for $B^+ \to K^+\pi^+\pi^-$.