

Search for $B^+ \rightarrow \rho^0 K^*(892)^+$ decay

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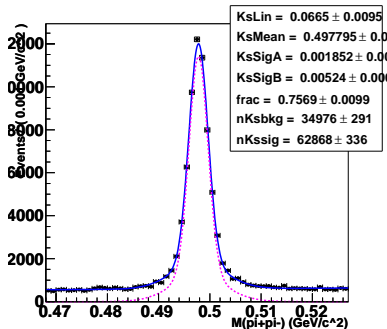
DCPV/rare, 2009.06.09

Overview

- 1 The analysis with signal MC
 - $B^+ \rightarrow \rho^0 K^{*+} (K^{*+} \rightarrow \pi^+ K_S^0)$
 - K_S^0 invariant mass :the pdf of $M(\pi^+ \pi^-)$ is changed
 - The helicity angle distribution for both channels.
- 2 Skim Criteria
- 3 Summary and next plan

The analysis with signal MC: $K^{*+} \rightarrow \pi^+ K_S^0$ channel

- Ks mass: to perform the fit with the double gaussian in
 $M(\pi^+ \pi^-) \in (0.468, 0.527) \text{ GeV}/c^2$
- The signal region in 2.0σ for wide gaussian.
 $M(\pi^+ \pi^-) \in (0.487, 0.508) \text{ GeV}/c^2$ (by fitting)

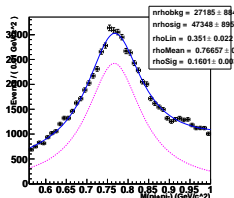


The analysis with signal MC: $K^{*+} \rightarrow \pi^+ K_S^0$ channel

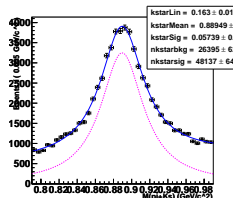
- ρ^0 mass: the window region is in 1.5Γ
 $M(\pi^+ \pi^-) \in (0.56, 1.00)\text{GeV}/c^2$ (by PDG)
- K^{*+} mass: the window region in 2.0Γ
 $M(\pi^+ K_S^0) \in (0.79, 0.99)\text{GeV}/c^2$ (by PDG)
- $\Delta E \in (-0.12, 0.12)\text{GeV}$
- $M_{bc} \in (5.20, 5.30)\text{GeV}/c^2$
- The difference of the detection efficiency is 0.24% between Breit Wigner and double gaussian for K_S^0 invariant mass.

	BW	2 gauss
# of generated events	0.3M	0.3M
# of signal events	33023	33764
efficiency	11.01%	11.25%

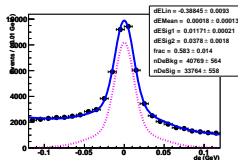
$M(\pi^+ \pi^-)$;



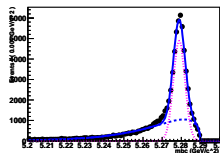
$M(\pi^+ K_S^0)$;



ΔE ;



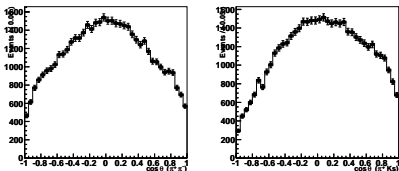
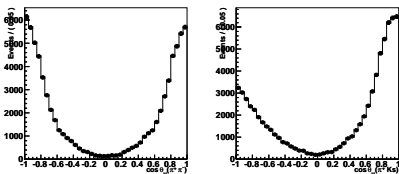
M_{bc} ;



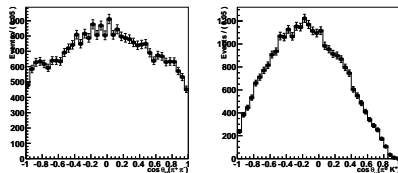
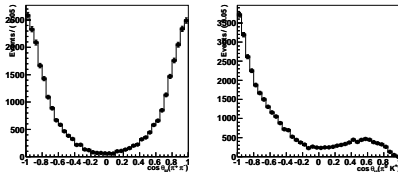
The analysis with signal MC: Helicity angles

- $\theta_{K^{*+}}$ is the angle between the direction of the π^+ or K^+ for $K^{*+} \rightarrow \pi^+ K_S^0$ or $K^{*+} \rightarrow \pi^0 K^+$ and the direction to the B^+ in the K^{*+} rest frame.
- The ρ^0 helicity angle is defined as the angle between the π^+ and B^+ momentum in the ρ^0 rest frame.

• $K^{*+} \rightarrow \pi^+ K_S^0$



• $K^{*+} \rightarrow \pi^0 K^+$



- We consider $K^{*+} \rightarrow \pi^+ K_S^0$ and $K^* \rightarrow \pi^0 K^+$
 - $K^{*+} \rightarrow \pi^+ K_S^0$: it should be existed the Ks(mdst_vee2 and kind == 1)
 - π^0 mass; $M(\gamma\gamma) \in (0.08, 0.18)\text{GeV}/c^2$
 - K_S^0 mass; $M(\pi^+\pi^-) \in (0.468, 0.527)\text{GeV}/c^2$
 - ρ mass; $M(\pi^+\pi^-) < 1.9\text{GeV}/c^2$
 - K^{*+} mass; $M(\pi^+ K_S^0) < 1.9\text{GeV}/c^2$
 - $\Delta E \in (-0.3, 0.3)\text{GeV}$
 - $M_{bc} > 5.19\text{GeV}/c^2$
 - γ energy; $> 0.05\text{GeV}$ for $K^* \rightarrow \pi^0 K^+$ channel
 - π^0 momentum for $K^* \rightarrow \pi^0 K^+$ channel: not yet
 - The skimming ratio is about 15% for both channels.
- generic B MC;
 - uds and charm MC of data $\times 3$ was skimmed.
 - mixed and charged MC of data $\times 6$; not yet
- rare B MC and data; will do

- For signal MC study
 - Changed the PDF of K_S^0
 - Checked the helicity angles
 - Self cross feed(SCF), and wrong combination(WC) in signal MC: doing
 - Finding the peaking decays: will do
- For skimming
 - Determined to the skim criteria : done
 - Skimming for $q\bar{q}$ background MC : done
 - Skimming for $b \rightarrow c$ background MC : doing
 - Applying for particle identification: will do