RESEARCH PROGRESS

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OUTLINE

1. Plan of Action for Analysis
   a) Sensitivity study of $D^0 \rightarrow K_L^0 \pi^0$
   b) Sensitivity study of $D^0 \rightarrow K_S^0 \pi^0$
   c) Systematics in $K_L^0$ reconstruction, counting and fitting

2. Error in analysis and rectification

3. GIM mechanism
Sensitivity study of $D^0 \to K_L^0 \pi^0$

- Generate signal Monte Carlo for $D^0 \to K_L^0 \pi^0$
- Write reconstruction code for $D^0 \to K_L^0 \pi^0$
  a) Use $D^0$ mass constraint to reconstruct $K_L^0$
  b) Tag by $D^{*+} \to D^0 \pi^+_{slow}$
  c) Count in bins of momentum, polar angle, $\Delta M$
- Skim data
- Analyse data for number of events
Sensitivity study of $D^0 \rightarrow K_{S}^{0} \pi^{0}$

- Generate signal Monte Carlo for $D^0 \rightarrow K_{S}^{0} \pi^{0}$
- Write reconstruction code for $D^0 \rightarrow K_{S}^{0} \pi^{0}$
  a) Reconstruct $K_{S}^{0}$ by the regular way
  b) Tag by $D^{*+} \rightarrow D^{0} \pi^{+}_{slow}$
  c) Count in bins of momentum, polar angle, $\Delta M$
- Skim data
- Analyse data for number of events
Systematics in $K_L^0$ reconstruction, counting and fitting

- Reconstruction efficiency in data and Monte Carlo for
  a) $D^0 \rightarrow K^+\pi^-, \ K^+ \rightarrow K_L^0\pi^-
     \hspace{1cm}$
     Reconstruct by $D^0$ mass constraint method
  b) $D^0 \rightarrow K^+\pi^+, \ K^+ \rightarrow K_S^0\pi^-
     \hspace{1cm}$
     Reconstruct by constraining $D^0$ mass(pseudo$K_L^0$)
     Reconstruct by regular method

- Study systematics of counting and fitting
Error in Calibration Analysis and Rectification

- There was a mathematical error in using $D^0$ mass constraint
- Has been corrected for the $K_L^0$ reconstruction.
- Brief explanation of GIM mechanism