



**BABAR**

# **BToDlnu**

## **Summer 2004 Skim Remarks and Caveats**

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What we lost and we cannot recover

What went wrong and we can patch

What we have to pay attention to

# BToDlnu event selection

The BtoDlnu skim select events with:

- a good lepton
  - a good D candidate
    - ▷  $D^0 \rightarrow K^+\pi^-, K^+\pi^+\pi^-\pi^+, K^+\pi^-\pi^0, K_S^0\pi^+\pi^-$
    - ▷  $D^+ \rightarrow K^-\pi^+\pi^+, K_S^0\pi^+$
    - ▷ *and its charge conjugated modes*
- N.B. Both  $D^0$  and  $\bar{D}^0$  can decays into  $K_S^0\pi^+\pi^-$*

Looking in:

CompositionFactory/CompBToDlnuSelector.cc

```
if (dsl.theD()->charge()==0 && dsl.theK()->charge()==0 && // D0->K0s pi
dsl.thePi1()->charge() * // Prompt pion charge
dsl.theLepton()->charge() // Lepton charge
== 1) // are the same
return false; // Throw away the candidate
```

These lines of codes basically halves the selection efficiency of

$$B^+ \rightarrow \bar{D}^0(X)\ell^+\nu \quad (\bar{D}^0 \rightarrow K_S^0\pi^+\pi^-)$$

The events not selected are lost (bug fixed in the Fall 2004 skim)

## $B \rightarrow D^* e \nu_e$ and User Variables missing

The selected events have a list of Semileptonic B candidates.

- The  $B^- \rightarrow D^{*0} e^- \bar{\nu}_e$  and the  $B^0 \rightarrow D^{*-} e^+ \nu_e$  (and charge conjugated) candidates are completely missing
- Fix in CVS for the Fall 2004 Skim  $\Rightarrow$  works in release series 16
  - ▷ *most notably Muon Neural Network selection instead of micro cut based*
- Contact me if you want a recipe to fix the bug for release series 14

The Semileptonic B candidates have a set of associated UsrVariables.

- The first part of the production was affected by a misconfiguration of some tcl file, preventing SkimMiniApp to write the UsrVariables
- Do not assume that your code related to UsrVariables is broken, perhaps are the UsrVariables broken too ;)

$$B \rightarrow D^0(X)\ell\nu$$

A real nasty bug affect the list of  $B \rightarrow D^0(X)\ell\nu$ . The very gory details:

- The CP ambiguity of the  $D^0$  list is by default evaluated on the basis of the very first  $D^0$  candidate produced by the program.  
(i.e. the very first  $D^0$  candidate of the very first event skimmed in a given collection)
- if:
  - ▷ *The very first candidate is CP ambiguous (i.e.  $D^0 \rightarrow K_S^0\pi^+\pi^-$ ) all the subsequent candidates are considered CP ambiguous*
  - ▷ *In these (few) collections you will found lot of:*

$$B^+ \rightarrow \bar{D}^0\ell^+\nu \quad (\bar{D}^0 \rightarrow \text{misassignment} K^+ X)$$
  - ▷ *Check the Kaon charge against the lepton charge!*
- else:
  - ▷ *The very first candidate is not CP ambiguous (i.e.  $D^0 \rightarrow K^+\pi^-$ ) all the subsequent candidates are considered not CP ambiguous*
  - ▷ *You loose half of the  $B \rightarrow D^0(X)\ell\nu$  with  $D^0 \rightarrow K_S^0\pi^+\pi^-$*
- Bug fixed in the Fall 2004 skim, contact me if you want a bug fix for the 14 series release

## Conclusions (JHAM)

- The Fall 2004 skim will hopefully fix the known bugs of the summer production
- If you are willing to use the Summer 2004 skim,
  - ▷ *Carefully read and understand the gory details reported in this presentation*
  - ▷ *Do not hesitate to contact me for clarifications, temporary patches*
- As always: keep your eyes wide shut and do not assume anything for granted!