# Semi-tauonic analysis

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### Validation plots: BII-3825

In release 02-00-00 there seems to be a significant change in the normalization for all the D\* tau nu validation plots. In some cases the reference plot has very few entries, and it's quite hard to get any valuable validation out of them. In the attachment, the reference in black, release 02 in yellow/brown



#### Result File: 1163350000\_Validation download nightly-2018-07-14

### Framework Update

- Updated to release-02 : global PID
- Will implement 2 versions of the code:
  - Release-01-02-11
  - Release-02-00-01
- Added/verified the following variables:
  - $\square Pmiss \rightarrow (Added our own definition)$
  - □ Q2  $\rightarrow$  Wrong definition was used before (made my own)
  - M2recoil (adjusted framework to use M2RecoilSignalSide)
  - Btag decay mode, Btag daughter invariant mass,
- Current setup makes Y4S candidate and then the ROE of Y4S.
  - Wondering if it is better to look in Btag ROE.
  - Problem: how to calculate the right Eextra if I look in Btag ROE.

### FEI Data Challenge sample: BO

#### B<sub>tag</sub> cuts:

- Mbc>5.27 GeV/c<sup>2</sup> •
- -0.2<DeltaE<0.2 GeV.
- signalProbability>0.001

- Data challenge (1 ab-1) sample • skimmed with release-02 training.
- MC9 1 ab-1 skimmed with release-01-00-00 training.
- Currently MC9 is being reskimmed • with release -02-00-01.





#### hs h B deltaE

# Signal selection:

### B<sub>tag</sub> cuts:

- Mbc>5.27 GeV/c<sup>2</sup>
- -0.1<DeltaE<0.1 GeV,
- signalProbability>0.001

#### <u>D cuts:</u>

- **pi+:good** , track cuts and  $p_T > 0.1$
- K+:good , track cuts and  $p_{\rm T}{>}0.1$
- $\pi^0 \rightarrow \gamma \gamma$ 
  - Gamma tight list
  - clusterE1E9>0.7
  - 0.124 <InvM<0.140 GeV/c<sup>2</sup>
- $K_s^0 \rightarrow \pi^+ \pi^-$ 
  - 0.45<InvM<0.55 GeV/c<sup>2</sup>
  - merged list
- D candidates:
  - 1.8<M<1.9GeV/c<sup>2</sup>
  - p<sub>CMS</sub><3.0 GeV/</li>

#	Decay	BF
1	<b>D</b> + <b>→K</b> -π <sup>+</sup> π <sup>+</sup>	8.98 +/- 0.28%
2	$D + \rightarrow K - \pi^+ \pi^+ \pi^0$	5.98 +/- 0.23 %
3	$D+\rightarrow K_s^0\pi^+$	1.47 +/- 0.08 %
4	$D + \rightarrow K_s^0 \pi^+ \pi^- \pi^+$	2.97 +/- 0.11 %
5	$D + \rightarrow K_s^0 \pi^+ \pi^0$	7.05 +/- 0.27 %
6	D+→K <sub>s</sub> ⁰K+	1.05%
7	<b>D</b> <sup>0</sup> <b>→K</b> -π <sup>+</sup>	3.89 +/- 0.04 %
8	$D^0 \rightarrow K_s^0 \pi^0$	1.19 +/- 0.04 %
9	$D^0 \rightarrow K - \pi^+ \pi^0$	14.2 +/- 0.5 %
10	$D^0 \rightarrow K_{-\pi+\pi^-\pi^+}$	8.11 +/- 0.15 %
11	$D^0 \rightarrow K_s^0 \pi^+ \pi^-$	2.75 +/- 0.18%
12	$D^0 \rightarrow K_s^0 \pi^+ \pi^- \pi^0$	5.1 +/- 0.6%

### BO $\rightarrow$ D\*+ $\tau v$ :



### BO $\rightarrow$ D\*+ $\tau v$ :

hs\_h\_Bsig\_M2recoil



#### hs\_h\_Bsig\_Eextra

### BO $\rightarrow$ D+ $\tau v$ :

#### hs\_h\_Bsig\_M2recoil



### $B+ \rightarrow D0 \tau v$ :



### MC9: FEI BO with No CUTS



### MC9: Zoom in with cuts

### Mbc>5.27 and signal probability >0.001



# Return to release-01 MC7-based training for now.



### Continuum Suppression



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### Conclusion

- Double check  $q^2$  and  $p_{miss}$ .
- Rerun with release-01-02-11.
- Wait for new MC9 training.
- Look at D\*\* distributions.