FTKSim Status and plans

FTK Meeting 07/13/2006

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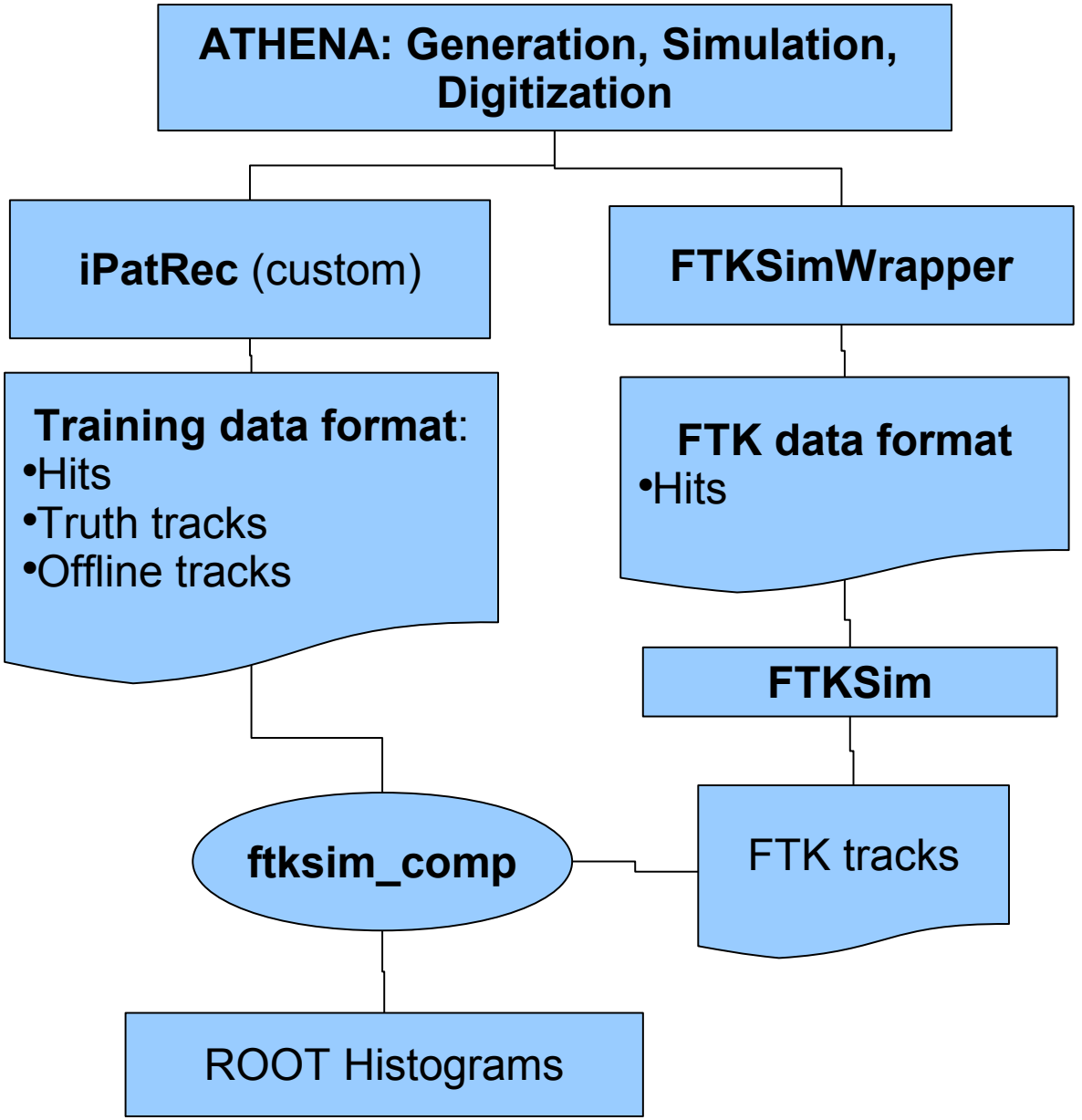
FTKSim performance control chain

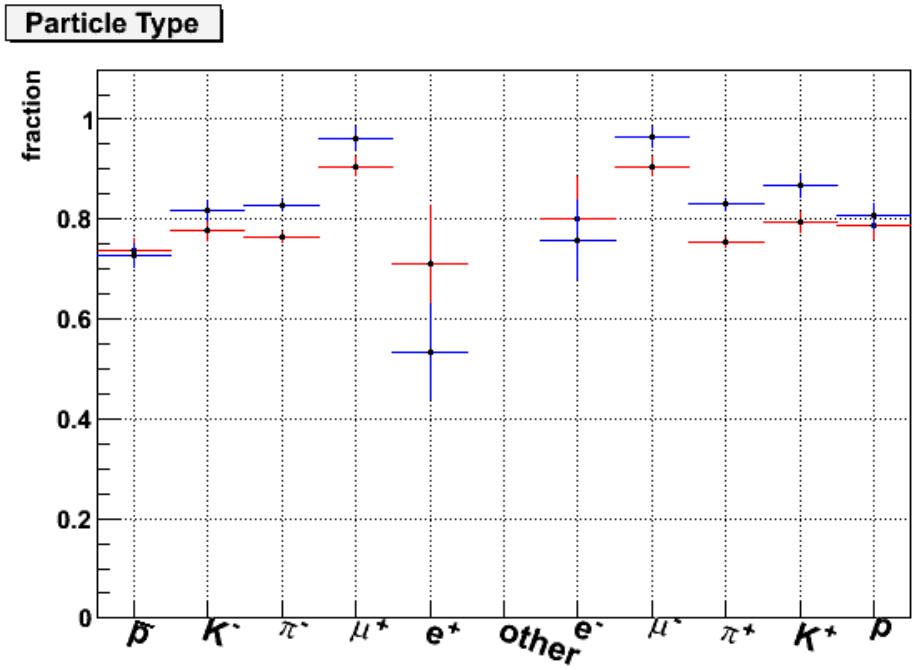
Our method to monitor the FTK performances use truth and offline tracks.
This method eliminate problems due to the ghost.

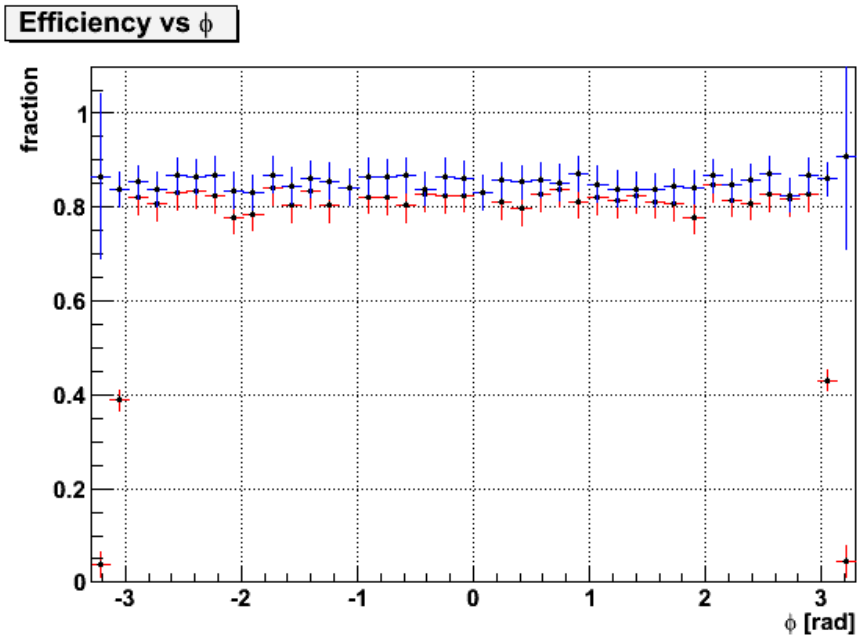
Recipes:
•iPatRec customized version
•FTKSimWrapper
•FTKSim

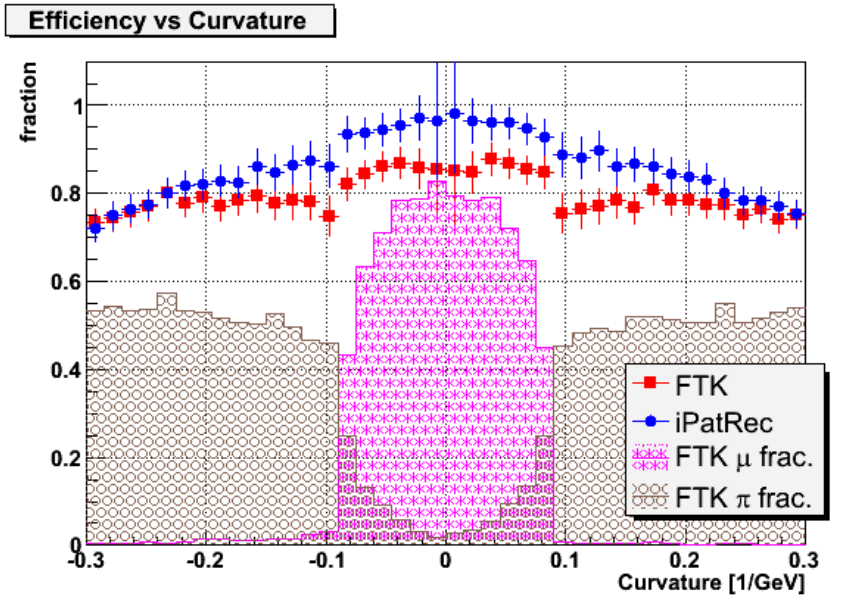


Bs->mumu

- Efficiency is greater than 80% in this sample
- Efficiency for pions and kaons is > 75%
- In curvature there are effects due to the different particle types in different curvature ranges.

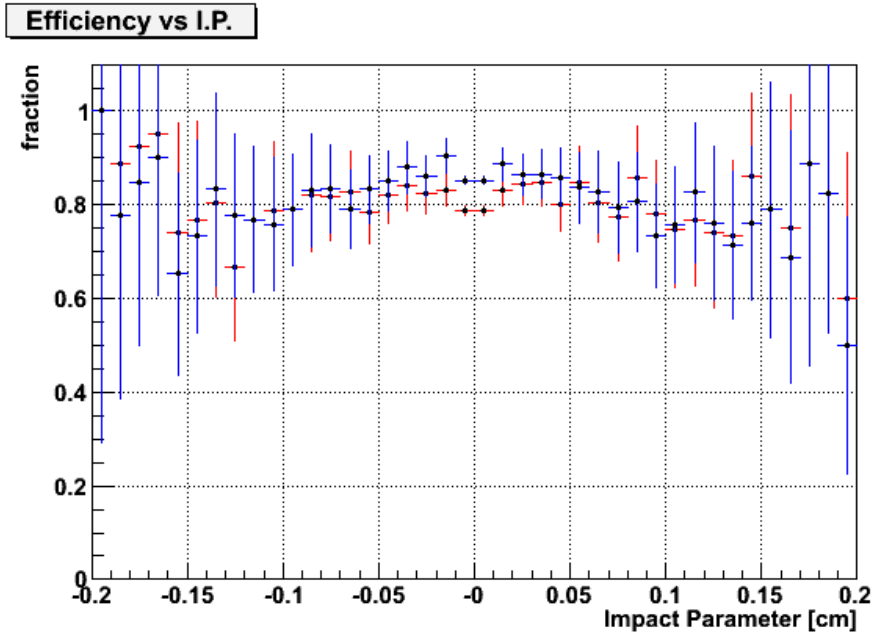


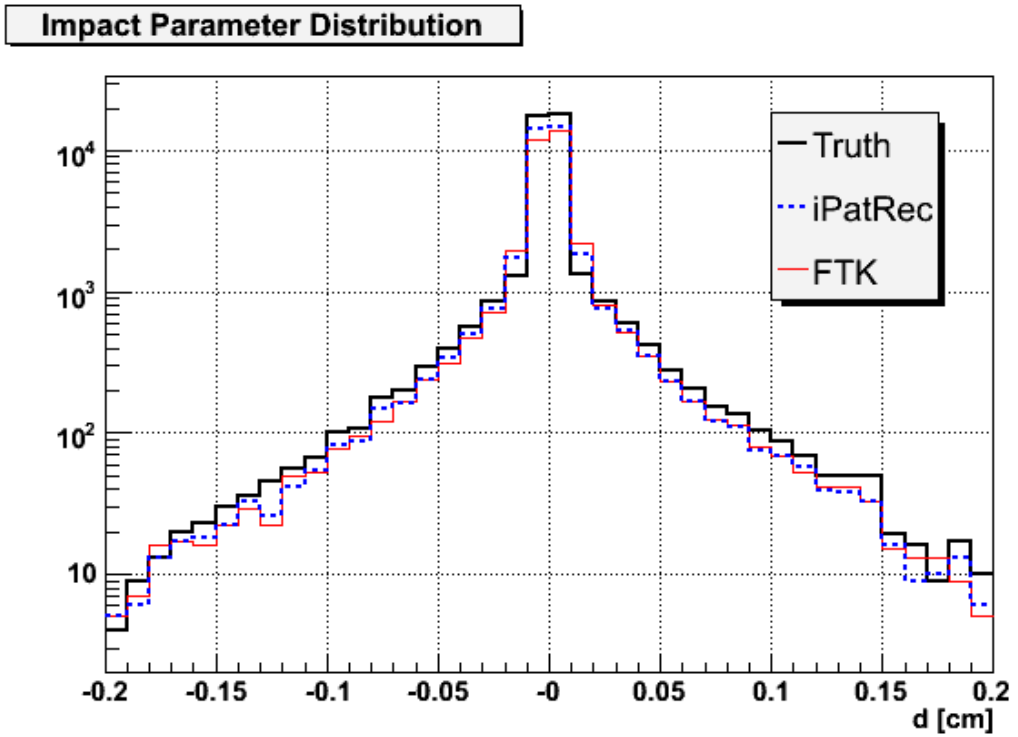




Bs->mumu (2)

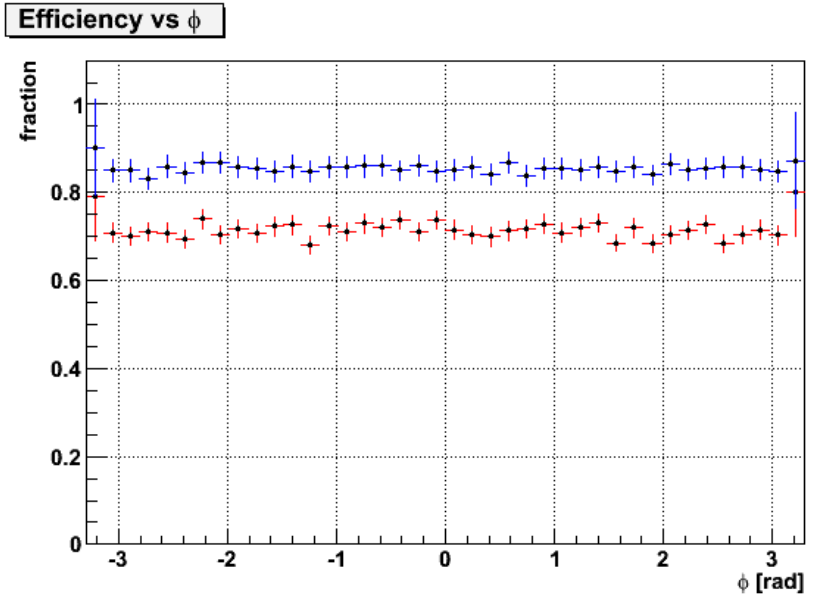
No particular problem in FTK, but also in iPatRec, to reconstruct trakcs with large impact parameter.

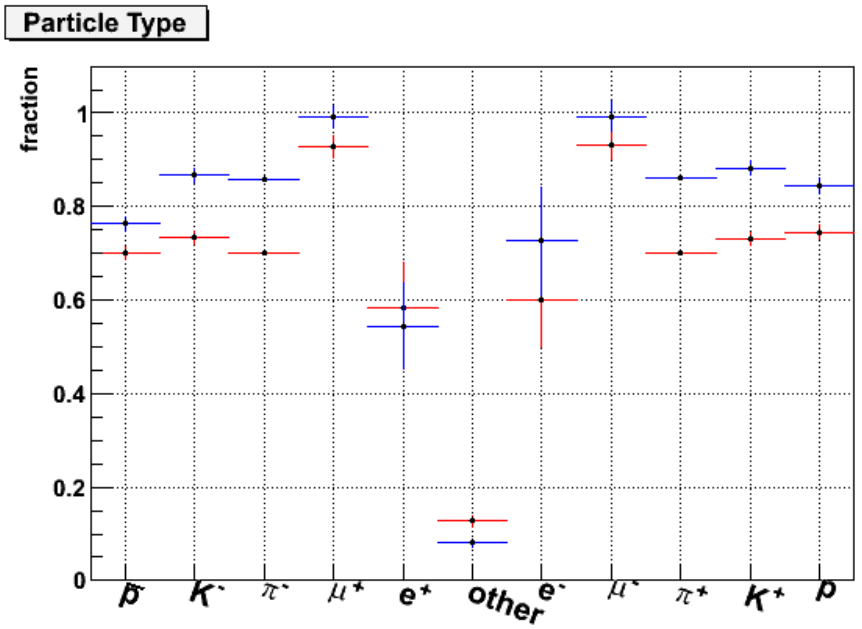


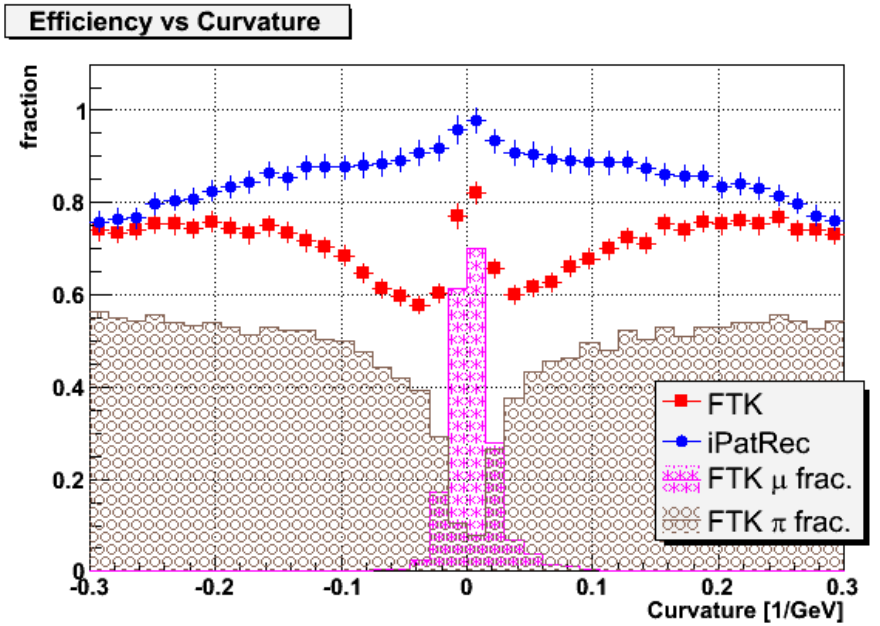


WH->munuuu

- We make same standard checks over this sample to validate FTKSim.
- FTK efficiency is lesser than Bs->mumu sample.
- Especially for pion and kaon.
- Plot of efficency as function of curvature is due to the various particle composition at differtents Pt



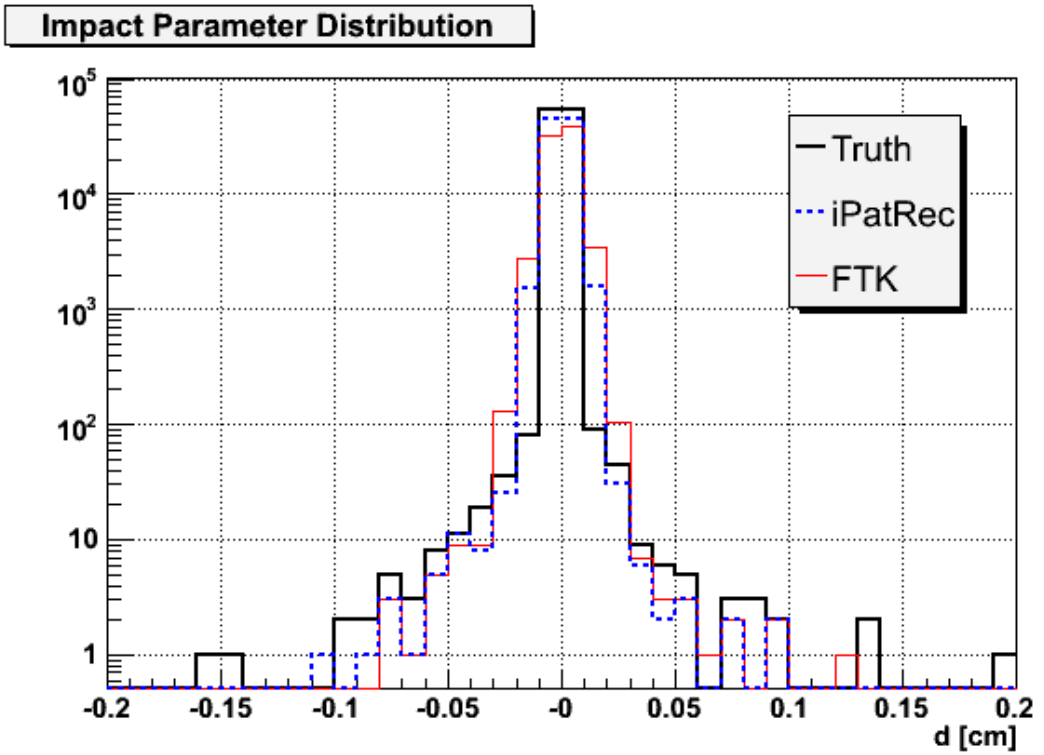


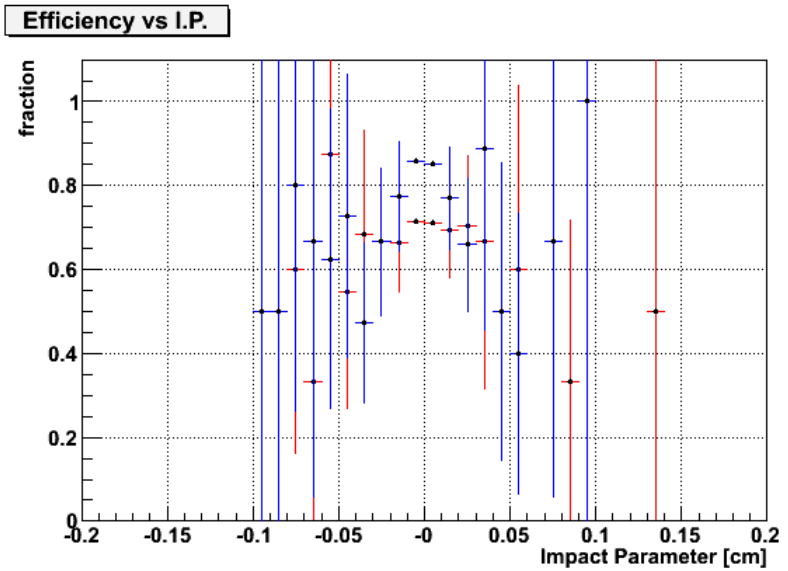


WH->munuuu (2)

Impact parameter spectrum seems well reconstructed

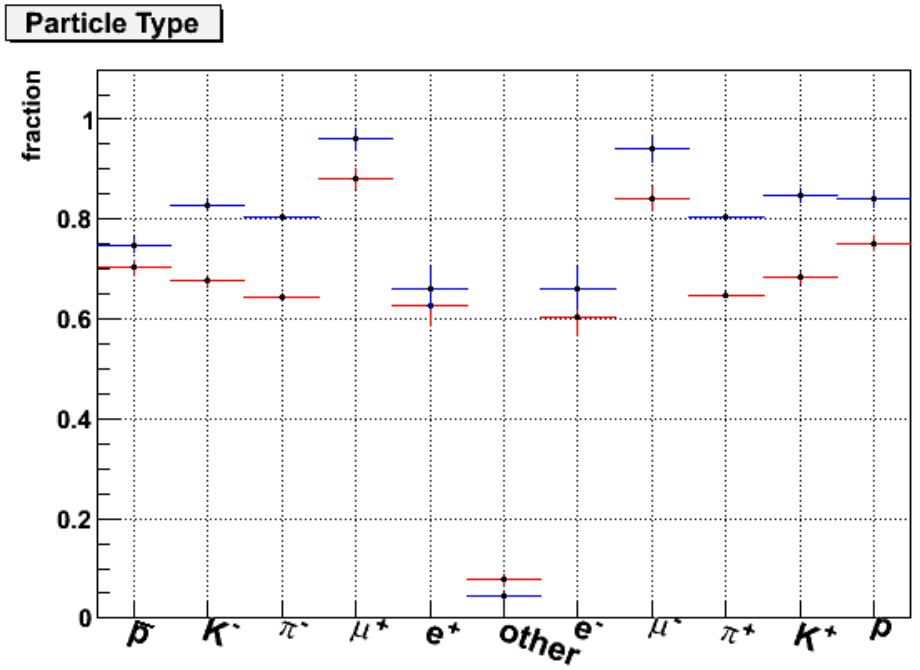
Not particular effects on efficiency as function of impact parameter of tracks

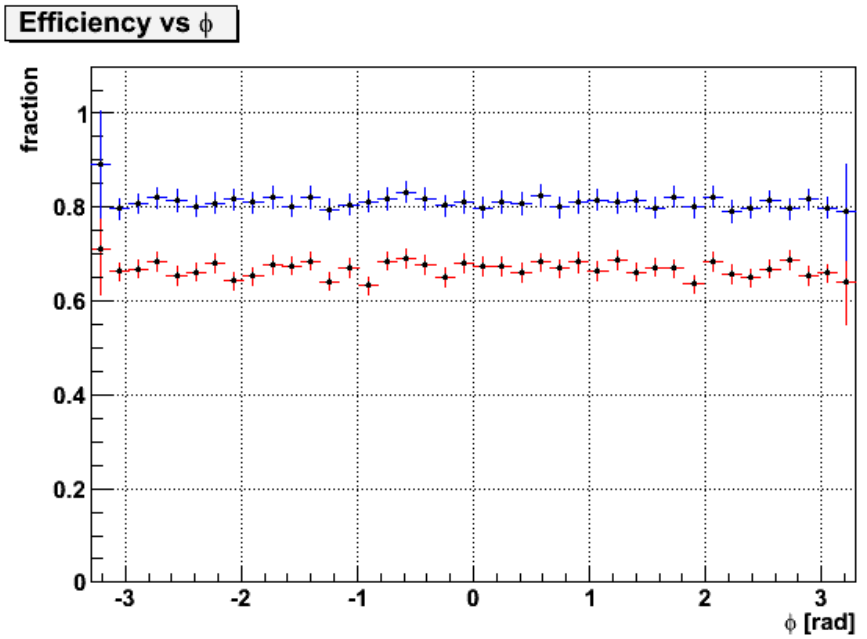


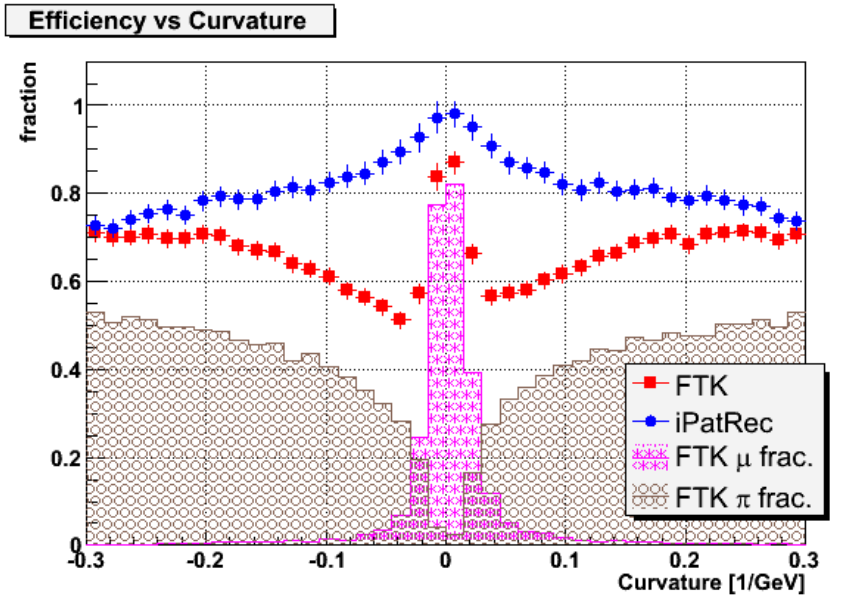


WH->munubb

Same effect on global efficiency and in particular on pions and kaons efficiency.

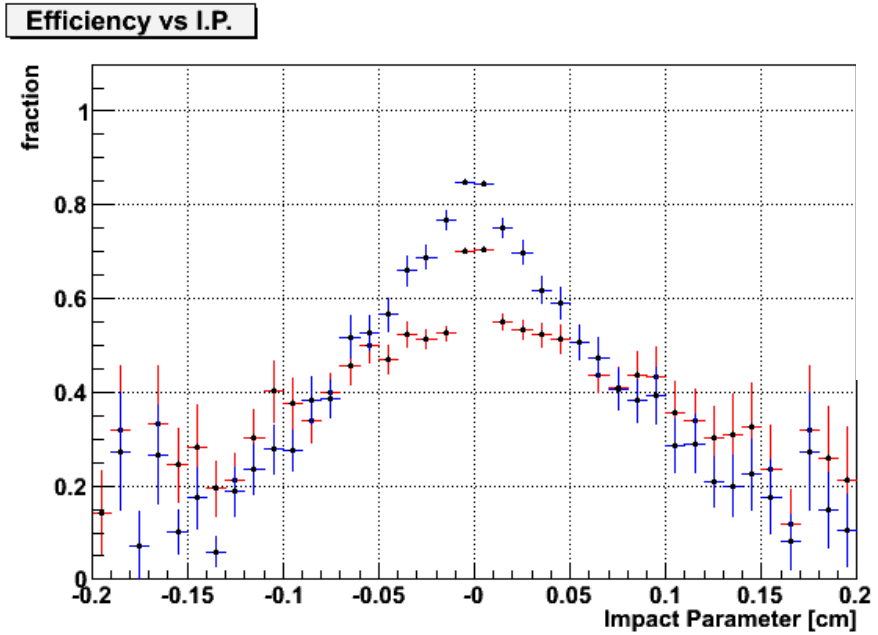


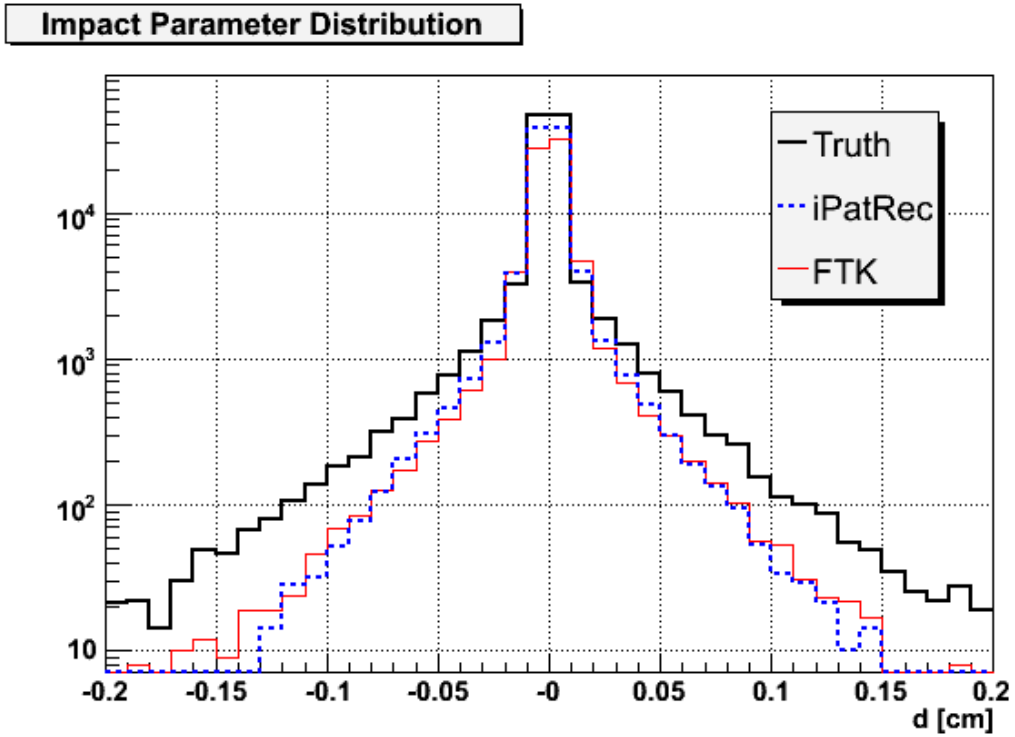




WH->munubb (2)

For the impact parameter we have a large inneficiency for large impact parameters, but also offline seems to have such problem.

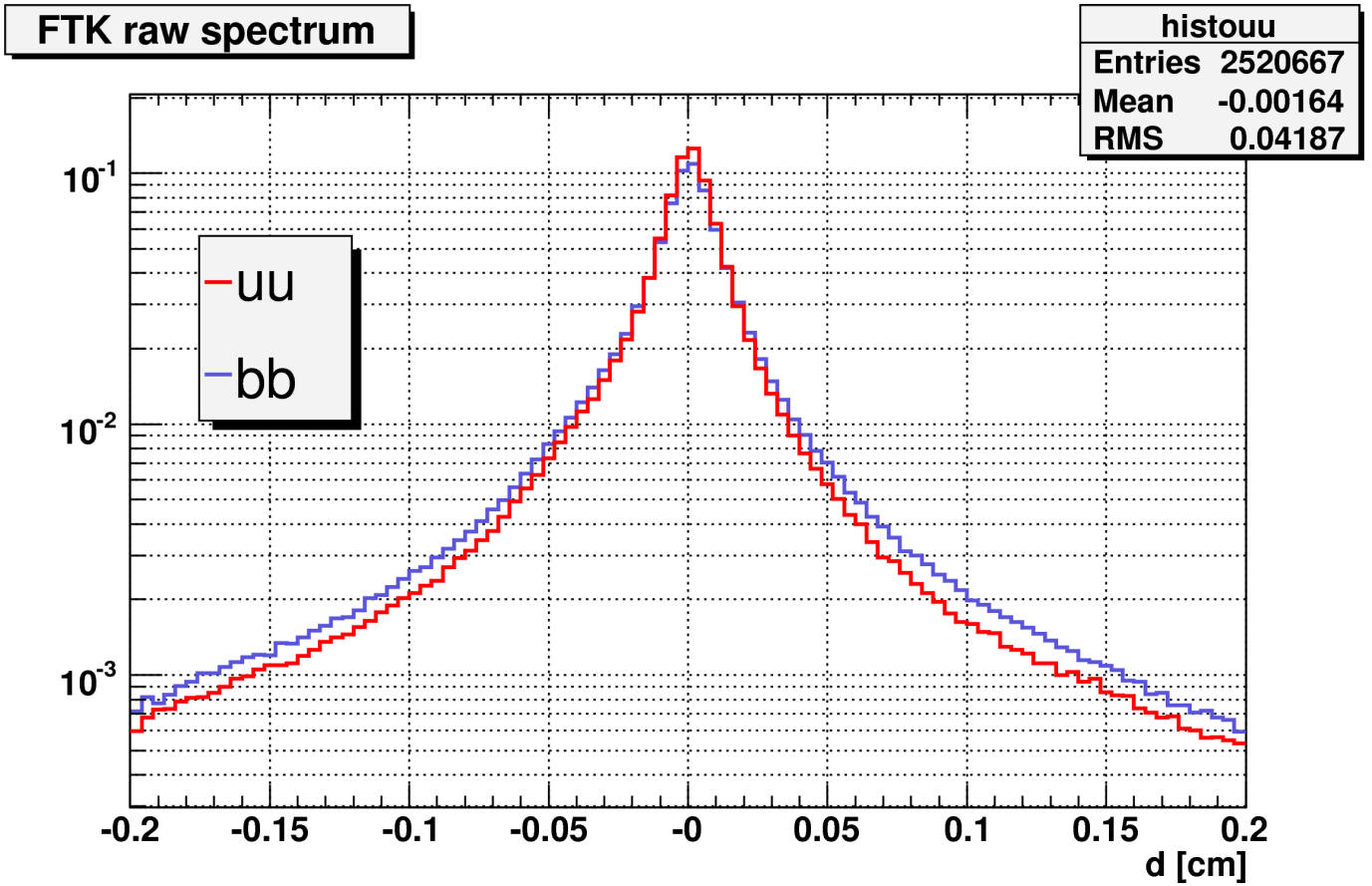




Checks: WH->munuuu WH->munubb

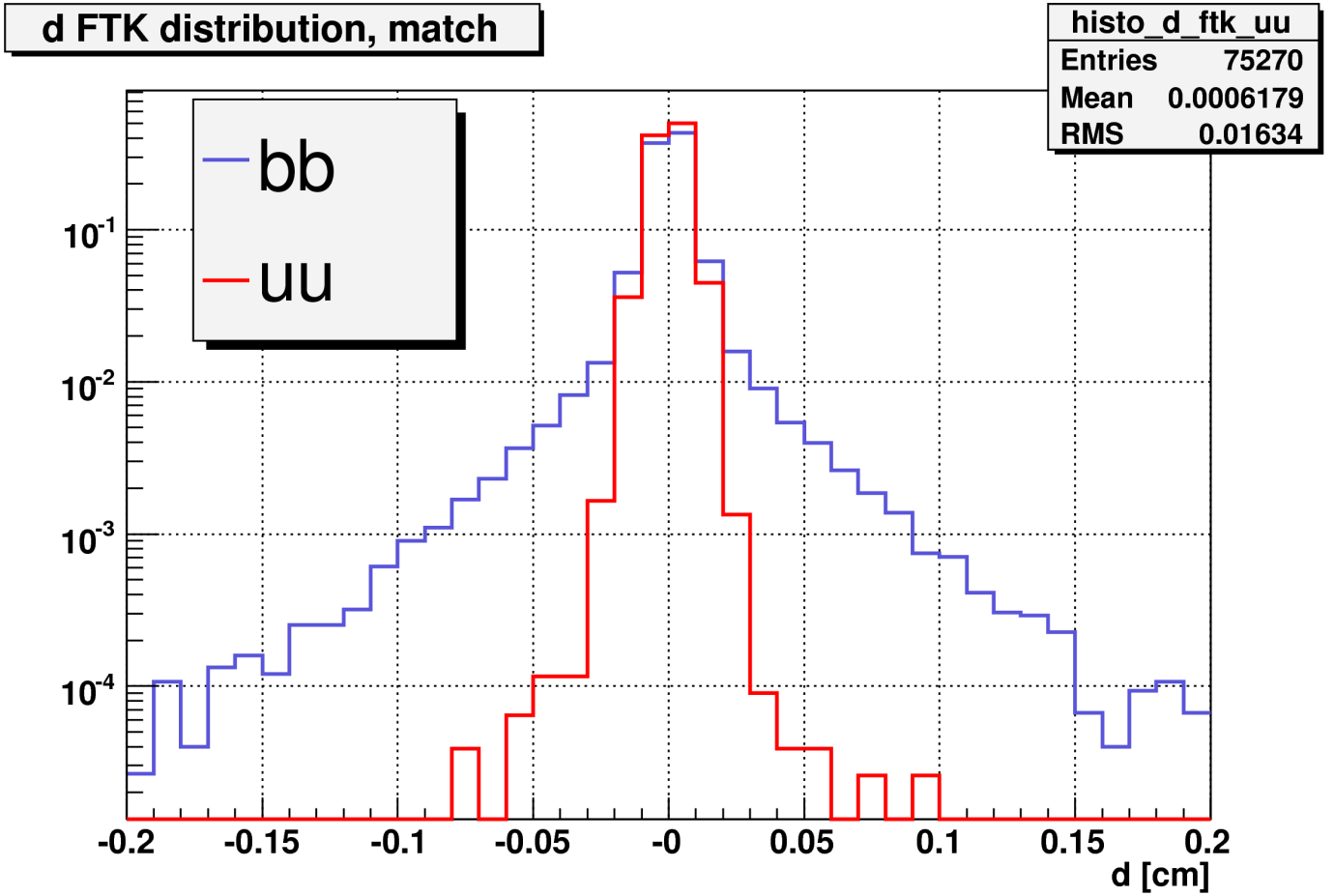
In a previous meeting was reported results of FTK over these control samples.

The distrubutions appear quite similar.



Checks: WH->munuuu WH->munubb (2)

Using only tracks that have matched with the truth the two distribution appear very differents.



Partial conclusions

- Bs->mumu and WH samples probably have some differences:
  - Pile-up?
  - Physics ineraction in ID?
  - Misalignments?
- FTK, with an offline match with truth, have good performances.
- Need to implement a method to remove ghosts without using other informations.
- Some tools to validate the FTKSim performances will be uploaded in my FNAL web pages.

Suggestions for the FTKsim user

1. Before starting to use a set of new files with FTKsim, please look at files using the offline tools (an offline track reconstruction algorithm like ipatrec).

3. Guido's tools to compare FTKsim performances with Ipatrec performances. Available @ http://fcdfhome.fnal.gov/usr/volpig
   Please use them to check track quality.

6. When track quality is guarantee everything else is easier

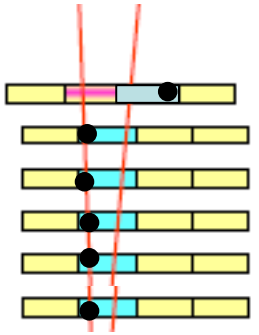
Possible residual motivation of problems:

Ghosts tracks produced by FTKsim require now a particular use of simulated tracks:
Guido tools are a good example of this use

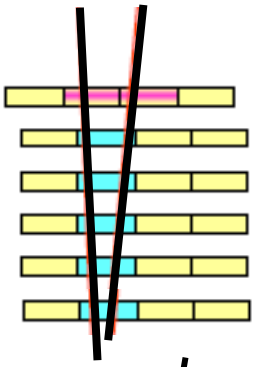
Next: Ghost handling Plan

Duplicated roads/tracks due to:

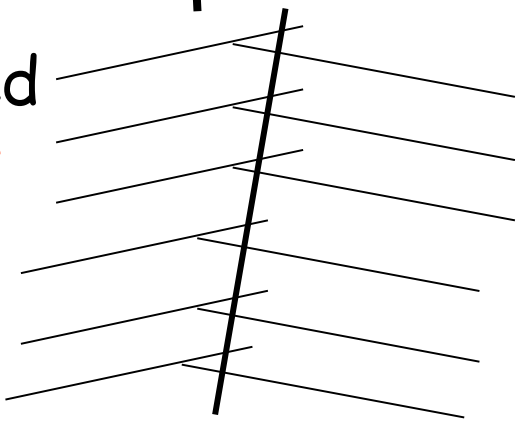
3. Deletion of 5/6 by RW when a 6/6 is available produces small inefficiencies if the 5/6 was the real track→ reject all 5/6 and do 7 fits in parallel (6/6 and all 5/6 combination) to choose the best χ^2



5. Deletion of 5/6 by RW not possible if the empty strips belong to different sectors



7. Training tracks going through the overlap region NOW produce many Ghost patterns not identified by the RW because of type 2. Reduce the ghosts of type 2 due to overlap regions, generating a single pattern



Changes to FTKsim

1. Generate again the pattern bank deleting ghosts due to overlap regions (Francesco).

3. Modify the Track fitter to perform 7 fits when a 6/6 hit combination is found (Guido).

MUON Trigger: WHAT WE HAVE UNDERSTOOD FROM ATLAS TALK

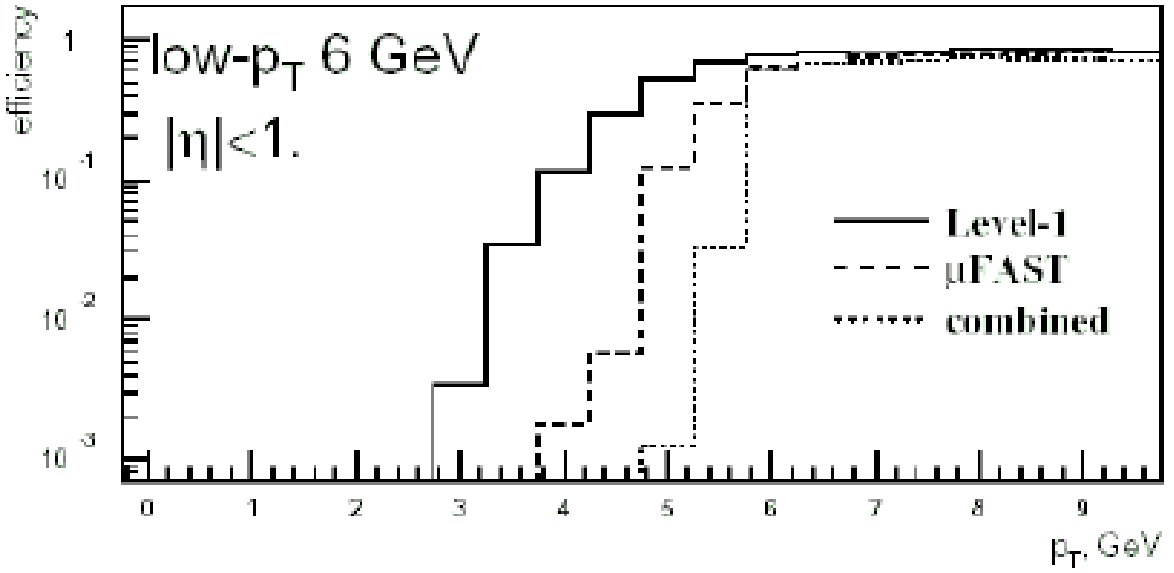
http://agenda.cern.ch/fullAgenda.php?ida=a062952

1. Single 6 GeV μ trigger in the ATLAS trigger plan for Instant Lum = 10^{33}. 2nd μ searched using jet ROIs or μ ROIs below 6 GeV

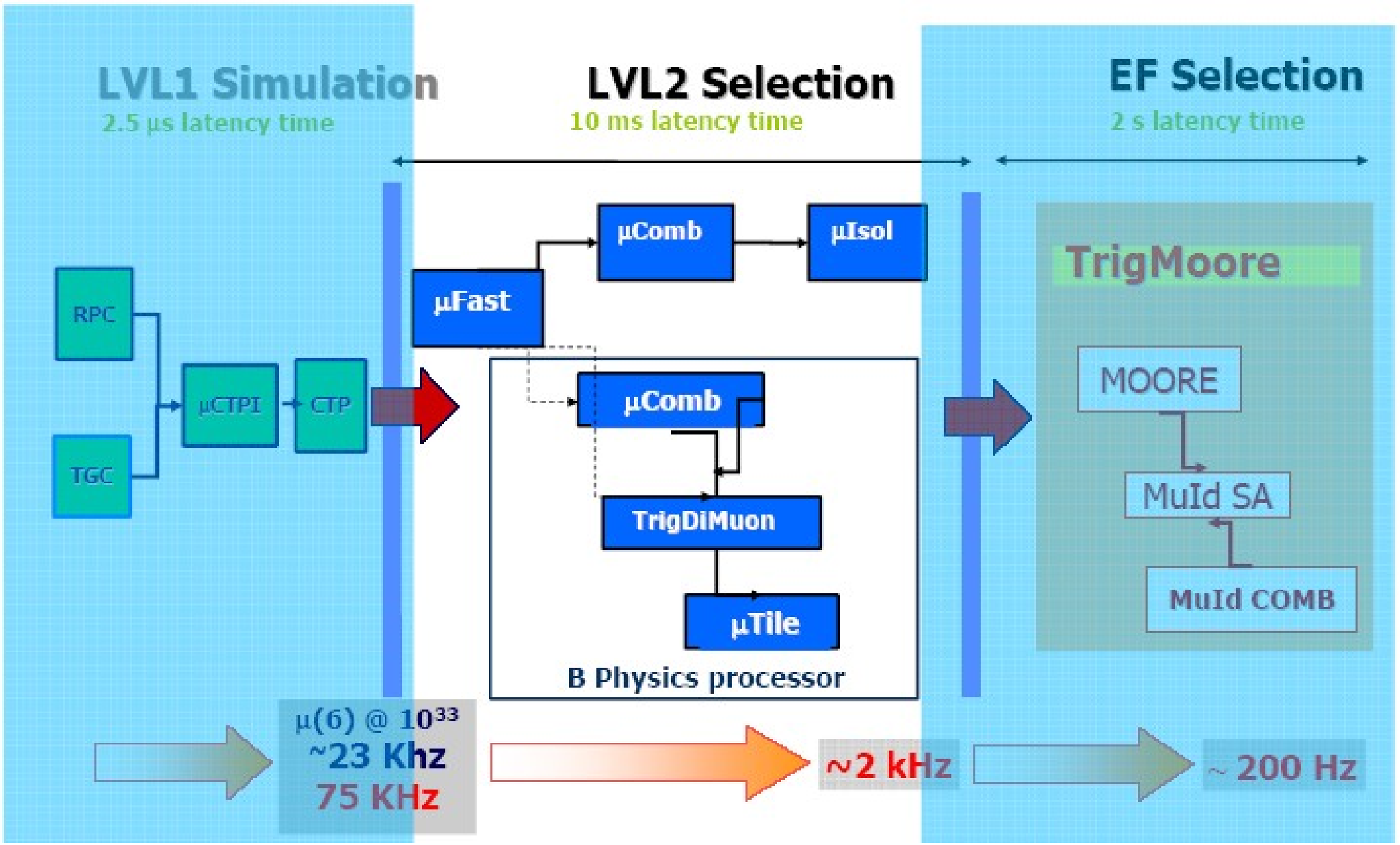
3. We suggest to look for 2nd μ using the list of FTK tracks above 3 GeV, ordered for decreasing Pt.

4. Muons are measured by the detector down to 3 GeV.

5. Muons are triggered in the barrel with a minimum threshold of 5 GeV



Muon Selection



LEVEL 1

Sources	Barrel		Endcap	
	6 GeV Thresh $L=10^{33}$	20 GeV Thresh $L=10^{34}$	6 GeV Thresh $L=10^{33}$	20 GeV Thresh $L=10^{34}$
π/K	9300	1090	5900	6400
c	1620	700	1800	1200
b	950	300	1000	600
W	3	27	~	~
Total	11570	2030	8700	8200

Sources	6 GeV Thresh $L=10^{33}$		20 GeV Thresh $L=10^{34}$	
	LVL1	LVL2	LVL1	LVL2
π/K	9300	3300	1090	90
c	1620	930	700	110
b	950	490	300	40
Total	11870	4720	2090	240

LEVEL 2-μ fast ~2ms

LEVEL 2-Mu-comb

Low p_t (6 GeV)	μFast rate (kHz)	μComb rate (kHz)
K/π decays	3.18	1.1
c decays	0.91	0.68
b decays	0.41	0.35
Fake L1	$<10^{-3}$	$<10^{-3}$
Total	4.5	2.13

TrigDiMuon

- Selects dimuons with m(μμ)>2.8 GeV (2^{nd} muon p_T>3 GeV)
- Apply m(μμ)<4GeV to select J/ψ(μμ)
- Physics performance estimated →

77% efficiency with 400 Hz background rate for $L=10^{33}$ (Based on 23KHz LVL1 mu6)

68% efficient for 270 Hz

TO do list for the Bs-> μμ

1. Scan the track list to find matches with the external μ. How many times they are the 2 most energetic tracks above 3 GeV?

3. How much the π/k background is reduced by this match FTK-track-MU?

THIS WORK IS STOPPED TO IMPLEMENT A GOOD GHOST HANDLING