

Ftksim updates

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Truth tracks in training

- Some events contain **multiple truth tracks**
 - Usually, second track has PDG of *electron*
- We used to associate the last track with *mu*
 - Sometimes, wrong constants used in training!
- Effect was relatively rare: once/50k events
 - But *electron's* $P(5)$ are vastly different from *mu*
- Simple fix:
 - Require exactly one truth track
 - Require $\text{abs}(\text{PDG})=13$ via TRAIN_PDG variable
- Problem: one clean event has hits in 1st quadrant, but truth in 3rd quadrant
 - Had to manually remove a bit from slices

Patterns-from-constants

- A lot of minor fixes, and one important fix
- Updated hardcoded numbers for slice ranges
 - Closely match the training ranges
 - A smaller range was OK, but slow
 - Code had to loop over too many sectors for out-of-range parameter values
- Updated autotune function to work at $\pm\pi$
 - phi is autotuned
 - Other pars are specified in config file
- Regions 4 and 5 need special attention
 - Next page

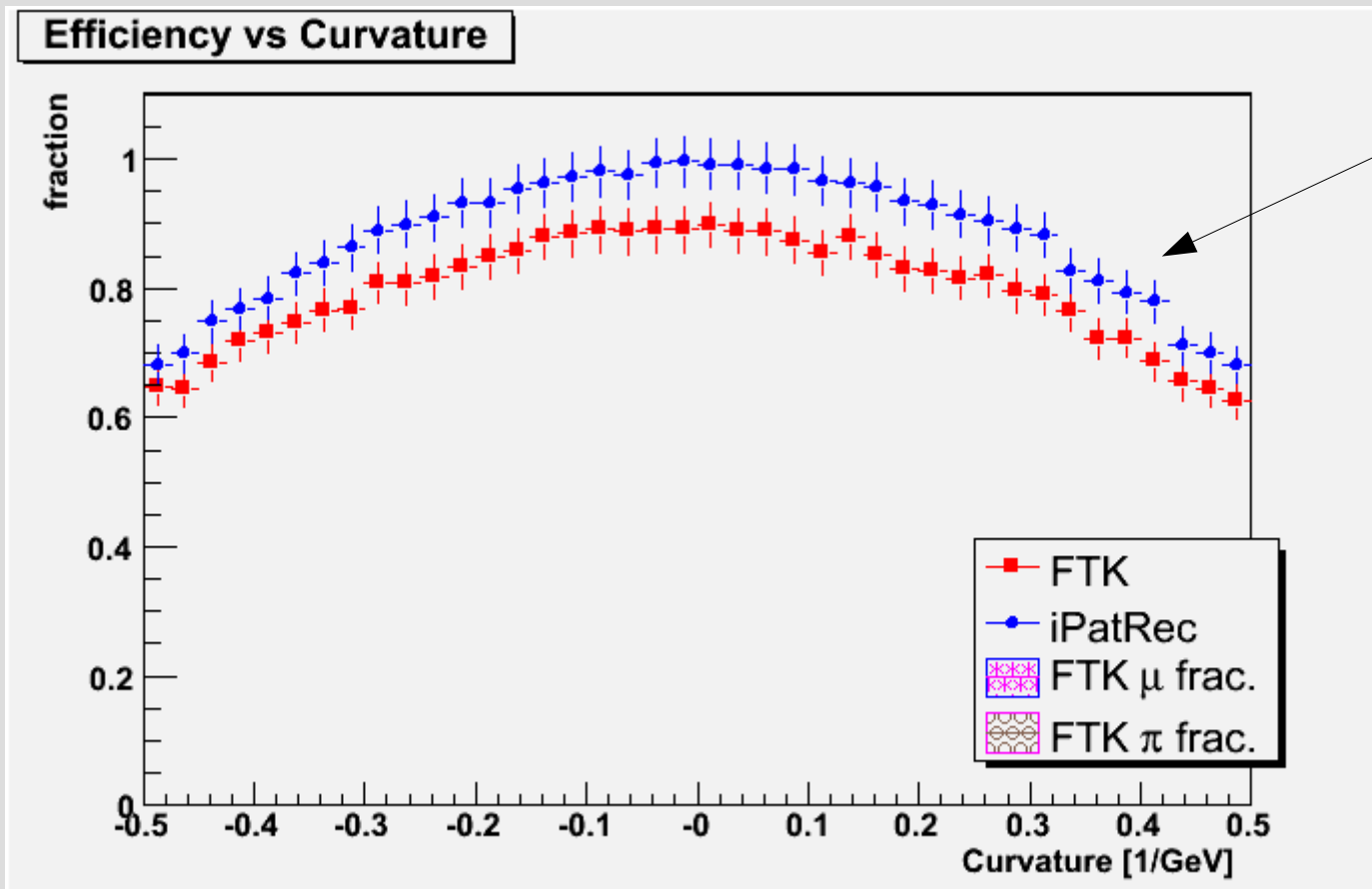
Regions 4 and 5

- In corrgen, phi is computed via atan2()
 - Range of $-\pi..pi$
- To properly handle averages, we convert:
 - If bank=4 or 5, convert to range $0..2*\pi$
- But: in patt-from-const code, we compute:
 - $X(14) = M^{-1} * p(5) + C(14)$
 - $P(5)$ is generated with range $-\pi..pi$
 - But this was incompatible with bank 4,5 consts!
- This is now fixed
 - Phi efficiency problem appears to be solved.
 - Banks 4 and 5 have uniform size with others
 - Used to run much slower and have fewer patterns

New banks

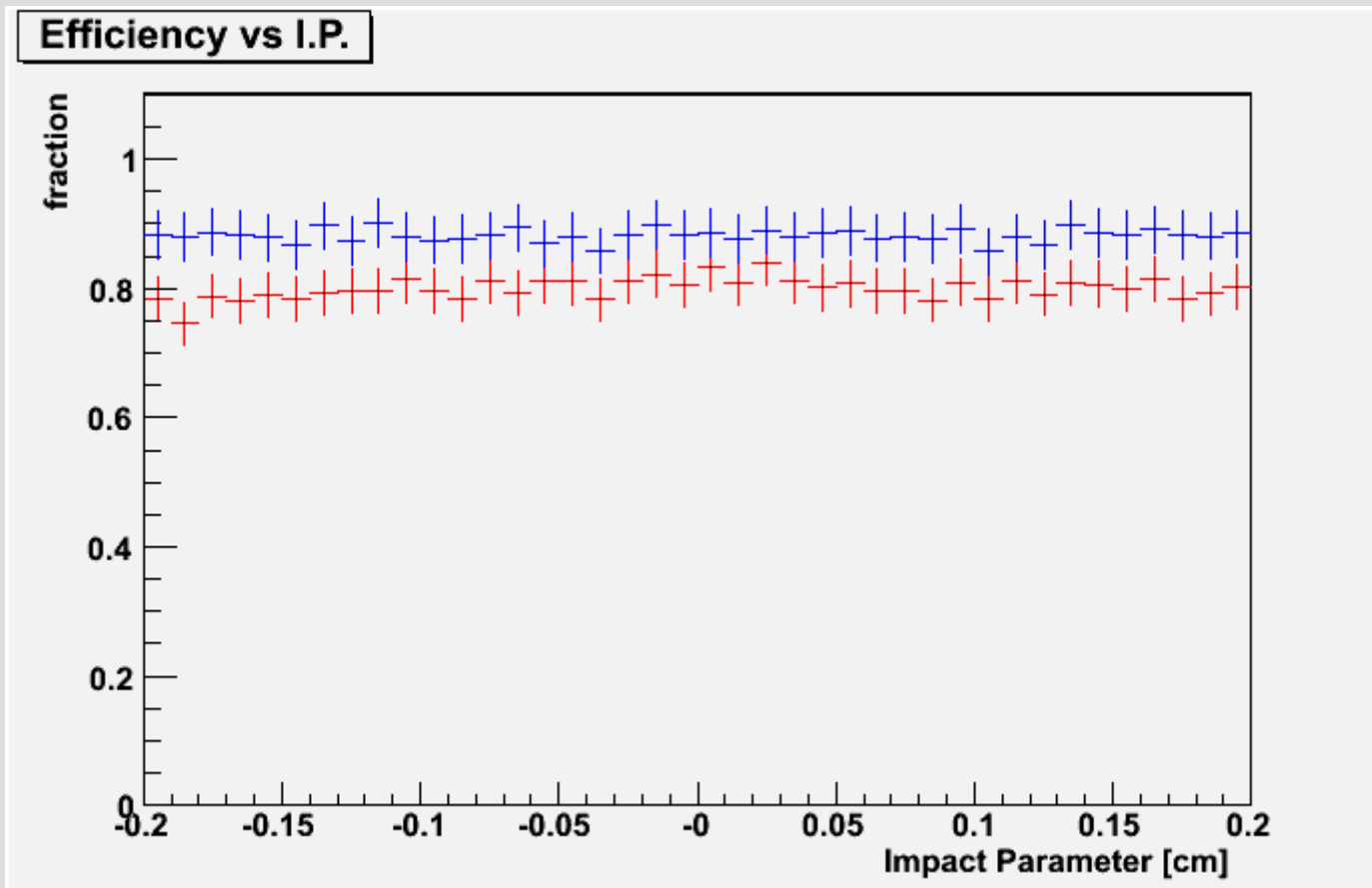
- New banks are ready (not on CASTOR yet)
- Patterns-from-const run a lot faster now
 - Takes 4 batches of 200M each to run (~2 days)
- Stats for patterns in each subregion:
 - Size on disk: 1.1-1.4 GB after >1-track cut
 - We should move to ROOT soon, as this is large!
 - Coverage: 84-85%
- Some standard plots on next page
 - $\cot(\theta) < 5$ in the plots
 - Applied as a cut to all plots

Curvature



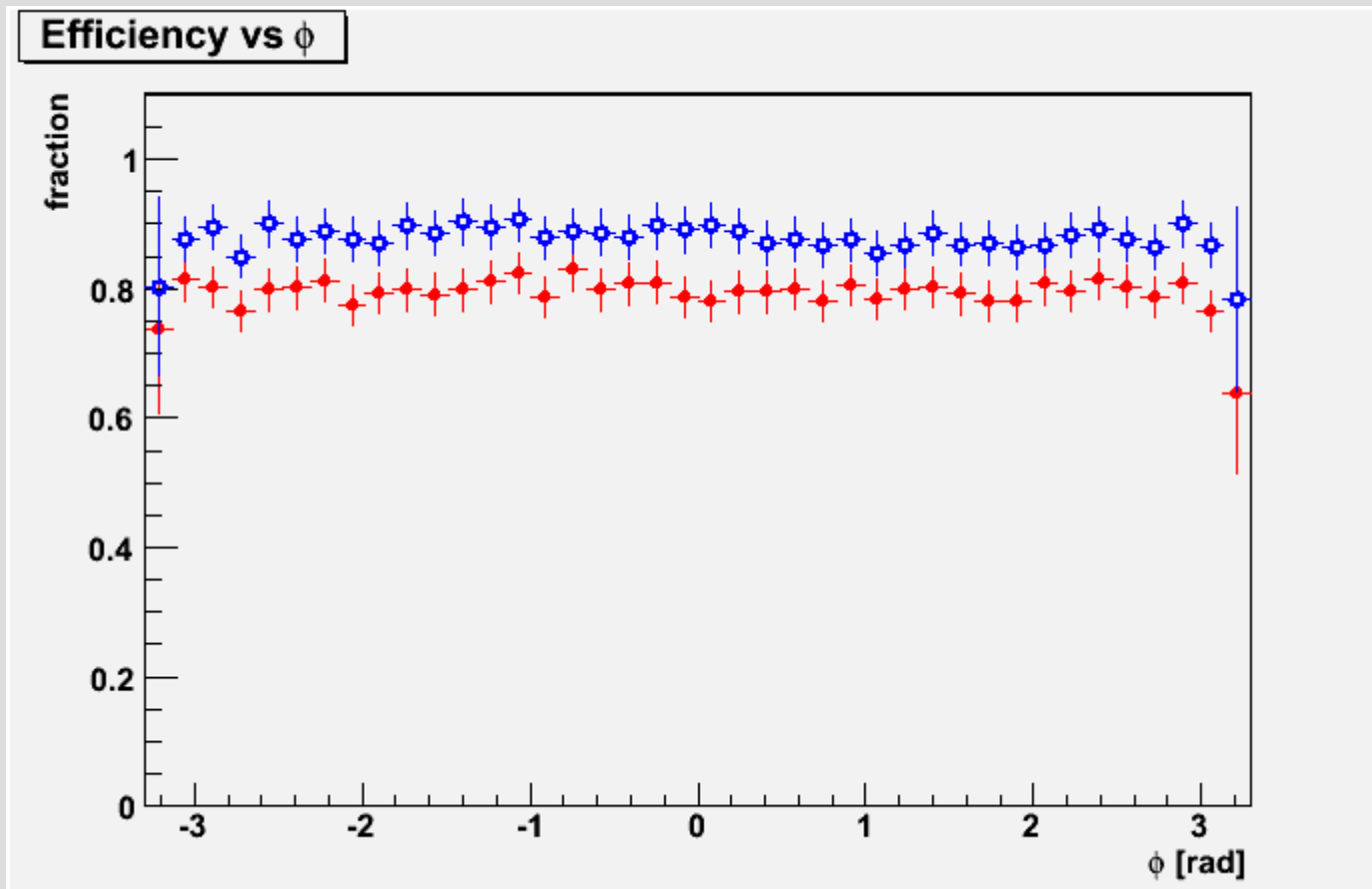
?

Impact parameter



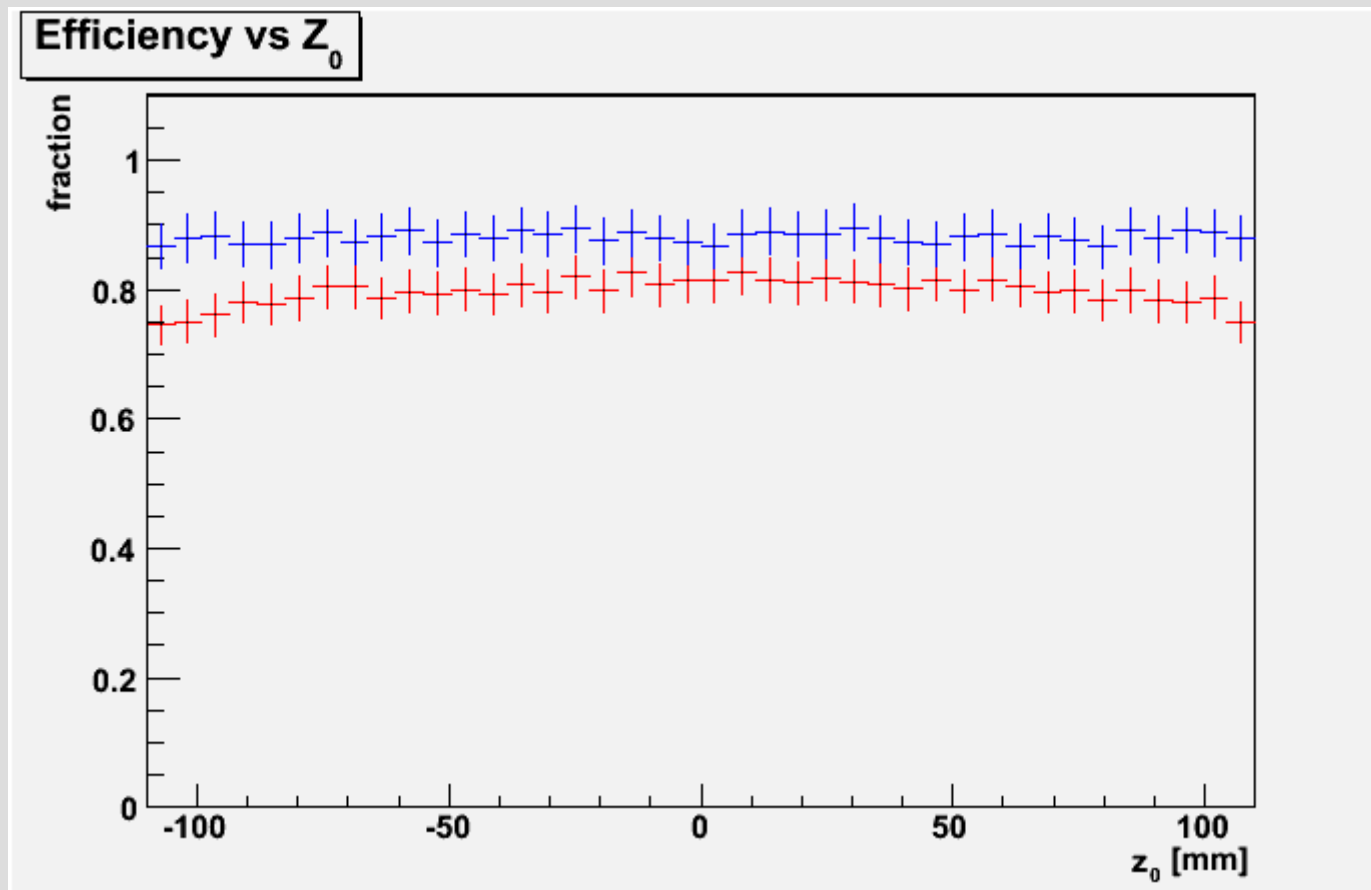
Looks very flat!

Phi



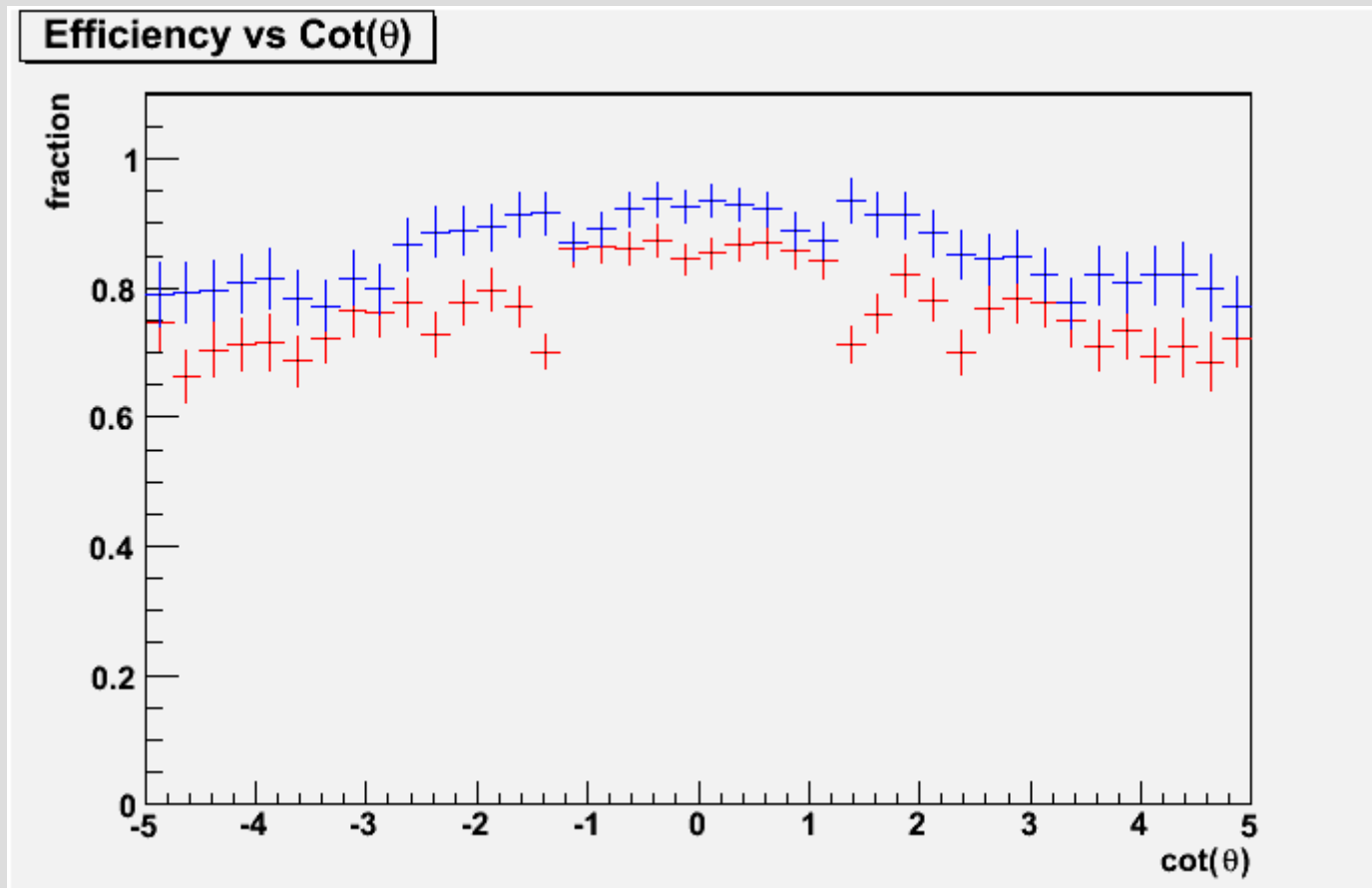
I think the edges show binning effect, because both IPAT and FTKSIM tracks are affected in the same way.

Z0

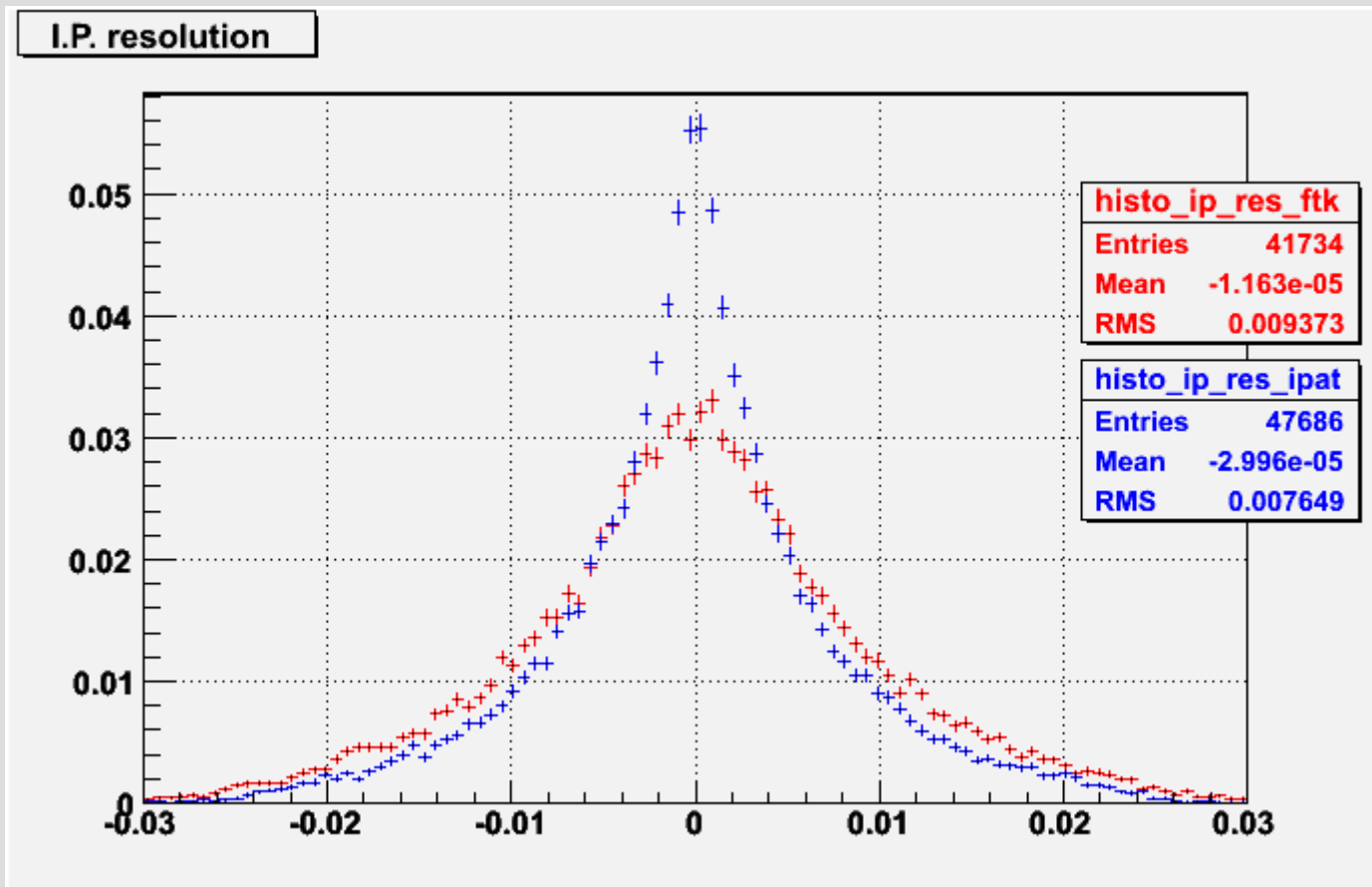


We may want to increase z_0 limit in future production (right now it is 120mm)
Note: plot above shows tracks up to z_0 of 110mm

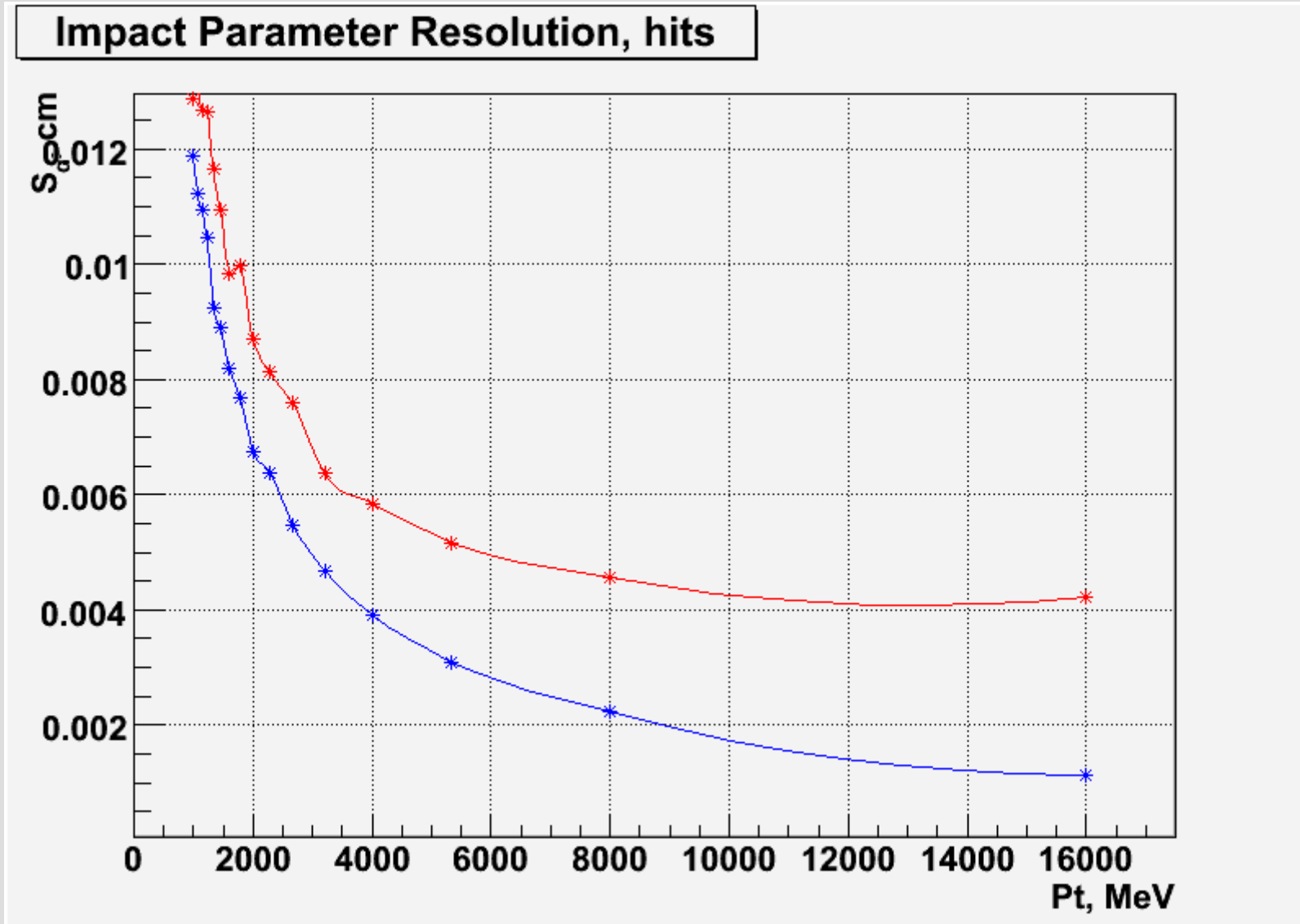
cot(theta)



IP resolution



IP resolution -vs- Pt



Ftksim updates

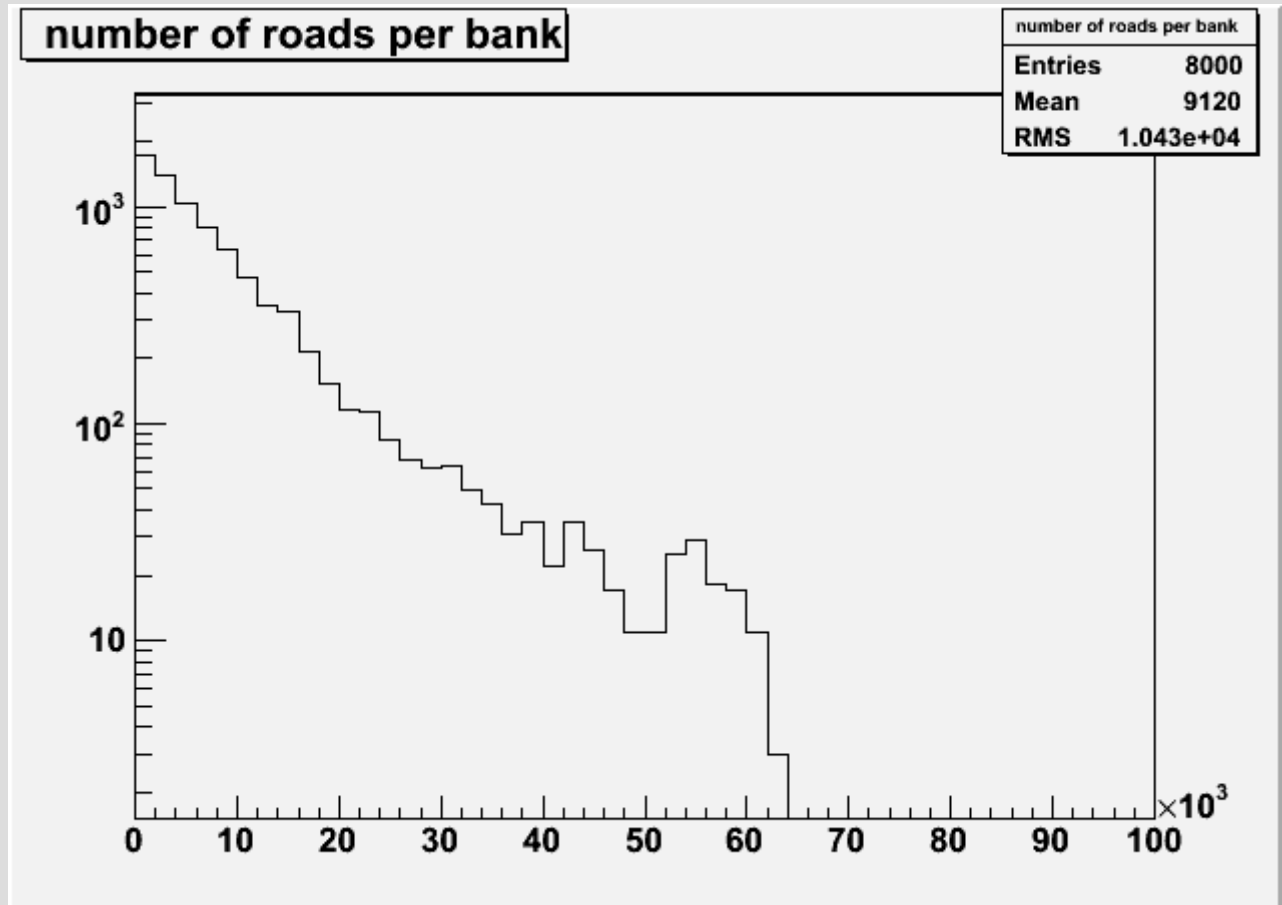
- Completely new statistics collection library
- Saved into root files in STL containers
- ROOTOUT=0,1,2,3 controls verbosity
 - 0: no statistics
 - 1: #sectors, #roads/sector, #fits per road, #hits per layer for each road. Fits are also classified into 11/11, 10/11, and majority fits.
 - 2: adds chi2, bitmask, p(5) for each fit
 - 3: adds X(14) for each fit
- ROOTOUTCLU=1 for clustering statistics
- Recommended level: ROOTOUT=1
 - Larger levels make large root files for WHbb³⁴

WH120bb at 10^{34}

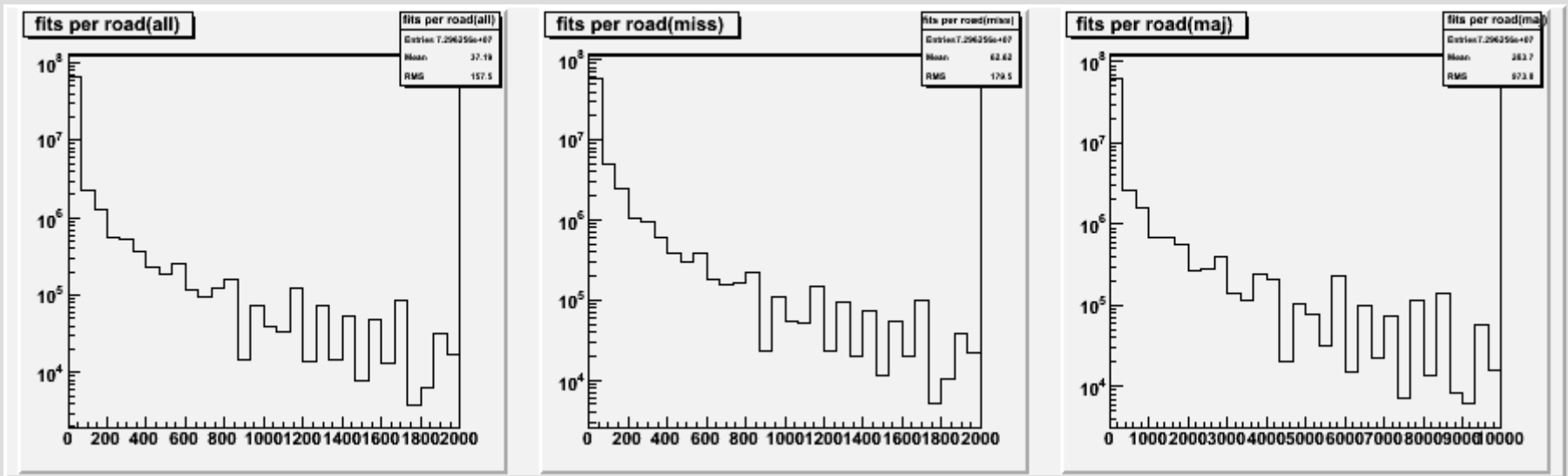
- Erik pulled the files to tier3 and ran wrapper
- 250 events, run time ~350 minutes
- But: run time is not uniform across events
 - Many events finish in a few seconds
 - One of the events takes ~1 hour in slowest bank
 - Time also depends on how busy given bank is
- Number of sectors for first 4 events:

	evt1	evt2	evt3	evt4
Sectors in bank 0:	1696	3797	2887	15596
Sectors in bank 1:	2773	2054	2517	15672
Sectors in bank 2:	3863	3108	2500	18020
Sectors in bank 3:	2352	3983	3661	16620
Sectors in bank 4:	2734	2926	3259	16452
Sectors in bank 5:	2781	3381	2878	16951
Sectors in bank 6:	2036	3666	2256	14984
Sectors in bank 7:	1987	3673	3993	14675

First results: Whbb at 10^{34}



First results: Whbb at 10^{34}



11/11 fits

10/11 fits
(excl. majority)

10/11 fits
(majority logic)