

Belle Starr Status Update

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Idea

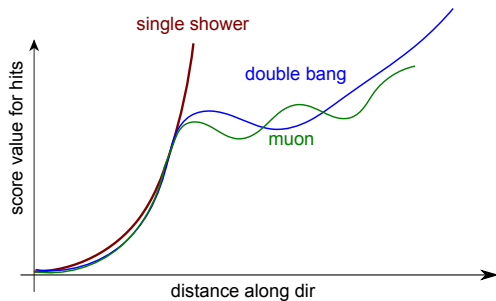
Perform a scan along a reasonable direction to find 2nd vertex

- Hadronic shower “easy” to find with suited hit selection:
 - merge all hits within 500 ns on same PMT
 - consider only first L1 on each DOM
 - tight clusterize parameters
- Good angular resolution from AAShowerFit

New profit idea

Idea

Perform a scan along a reasonable direction to find 2nd vertex



Neutrino vertex reco

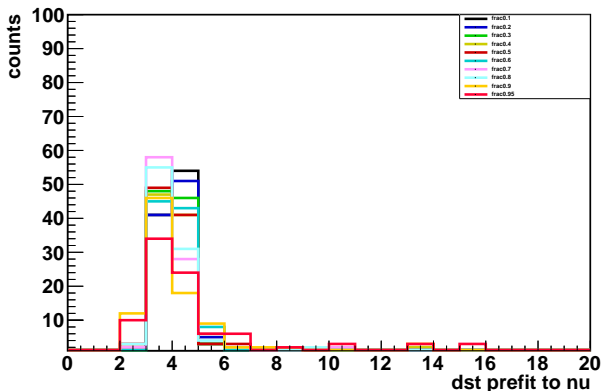


Figure : Distance between first prefit and hadronic shower maximum (calculation based on C.Copper thesis, different in km3?) for different bjorken y values at same flight length (60 meter)

Tau angle resolution

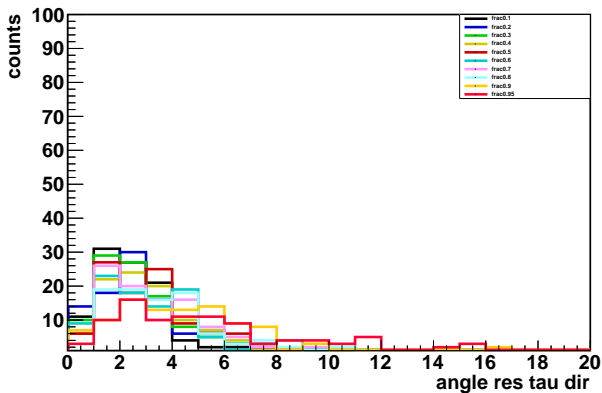


Figure : Angular difference between rec dir and tau dir for different Bjorken y values at same flight length (60 meter)

Direction scan

- Scan along the reconstructed direction
- Go -100 m to 100 m
- every meter make a scan point with
 $scan.t = dst(scan, start) / c_{light} + start.t$
- Make different hit selection or score function for each point

Sanity check, reproduce profit

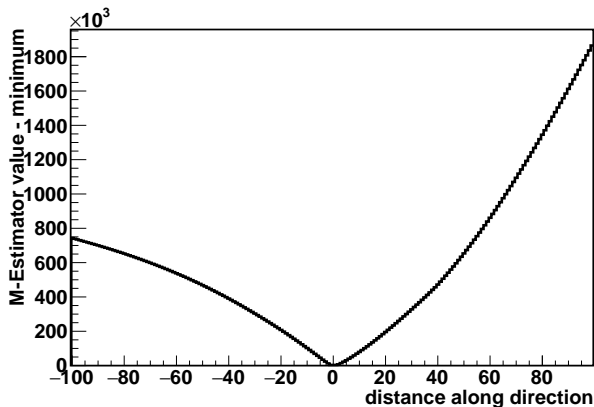


Figure : For the same hit selection as profit evaluate M-estimator score function along direction

Hit counting

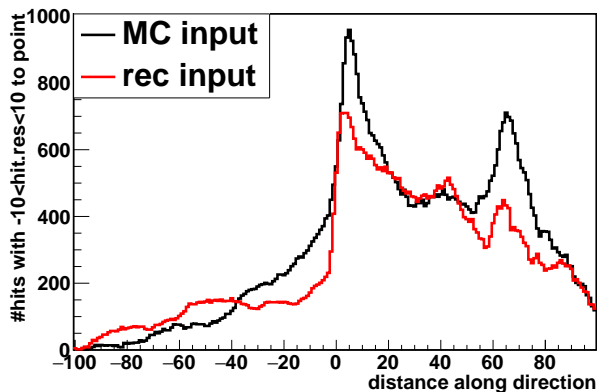


Figure : Number of hits with hit residual to scan point $-10 \leq res \leq 10$

Hit counting

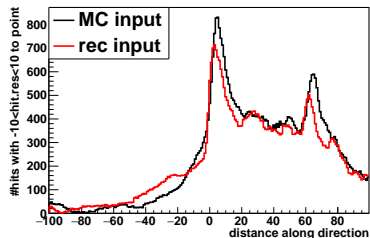
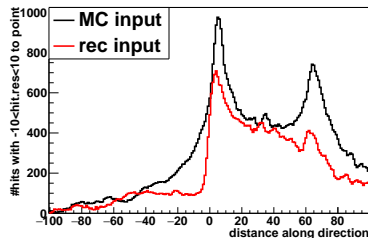
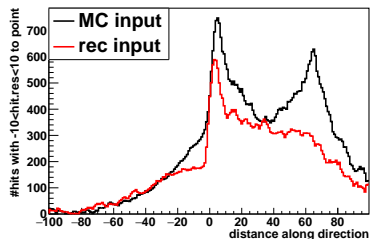
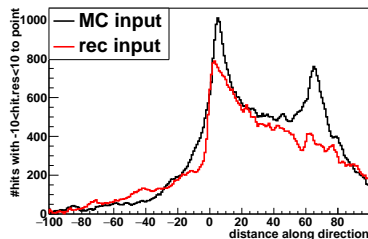


Figure : Number of hits with hit residual to scan point $-10 \leq res \leq 10$

Hit counting L1

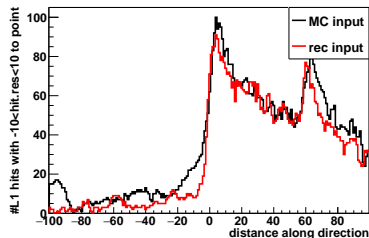
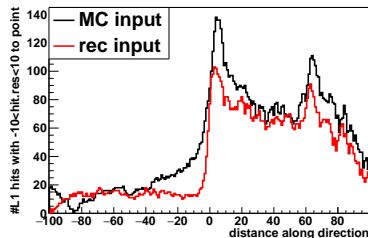
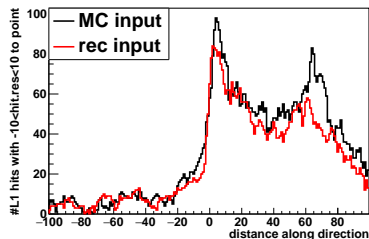
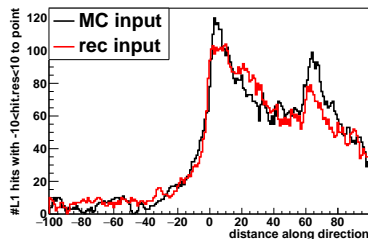


Figure : Number of L1 hits with hit residual to scan point $-10 \leq \text{res} \leq 10$

Hit counting discarding hits $-10 \leq res \leq 10$ to start

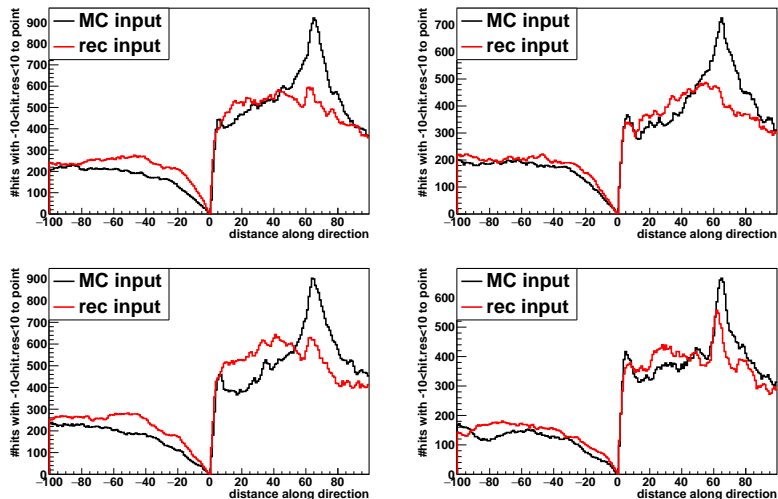


Figure : Number of hits with hit residual to scan point $-10 \leq res \leq 10$

From here

- make cylinder around direction and scan multiple directions in their to mitigate angular reconstruction error
- correct for geometry

Hit counting divide by PMT hit probability

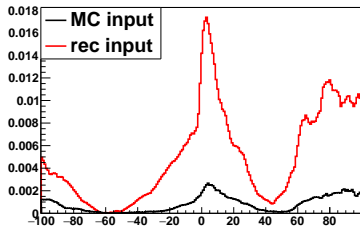
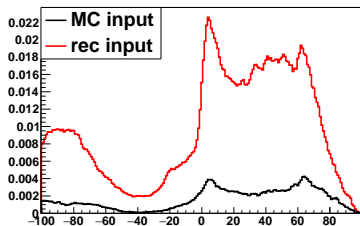
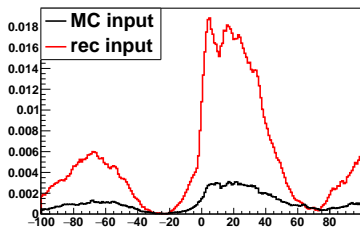
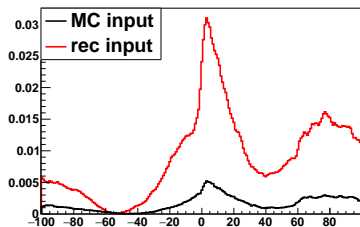


Figure : Number of hits with hit residual to scan point $-10 \leq res \leq 10$