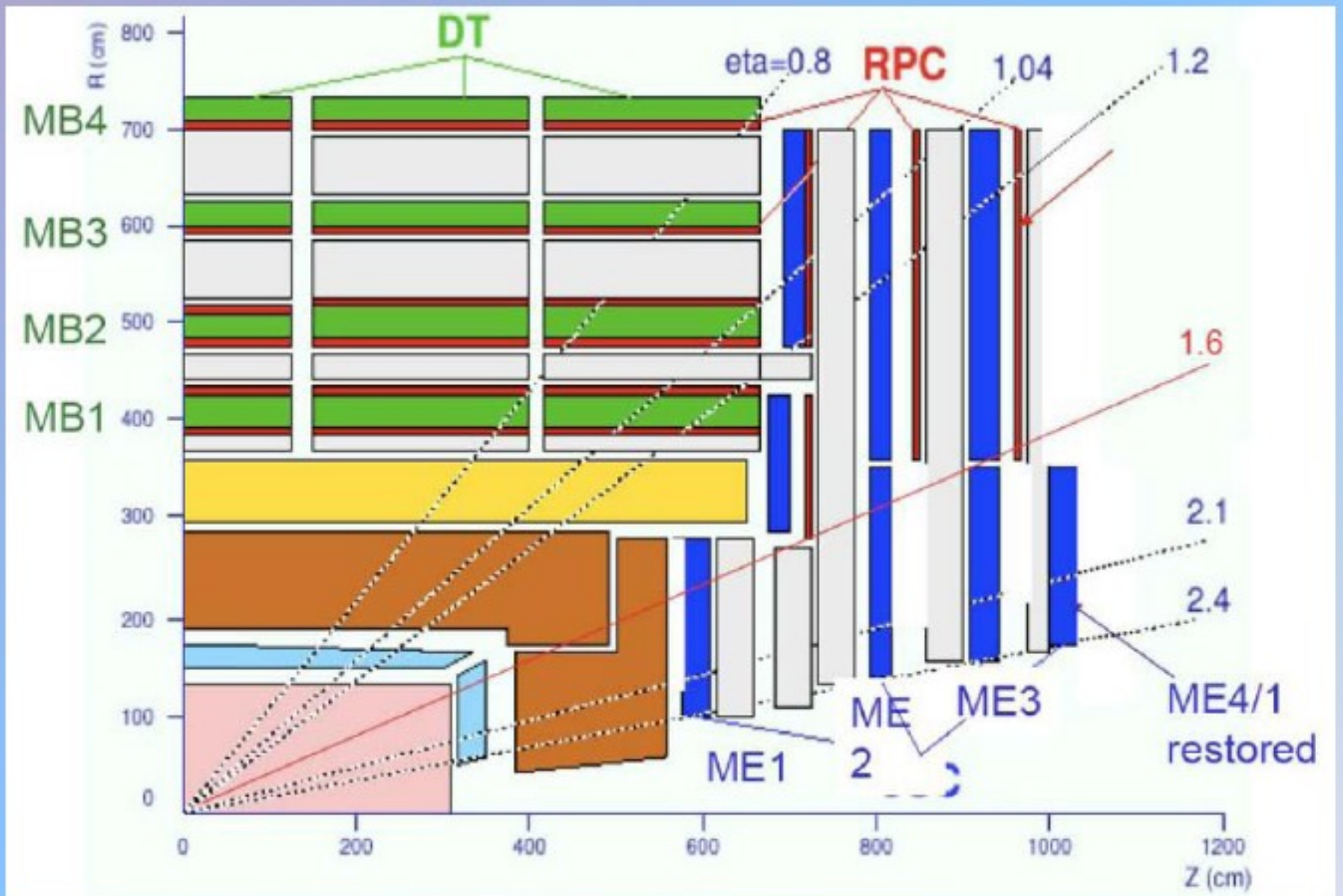


Hit-by-hit matching

<https://twiki.cern.ch/twiki/bin/view/Main/HbyHm>

- Z0->mumu gun sample
- CMSSW_3_7_0

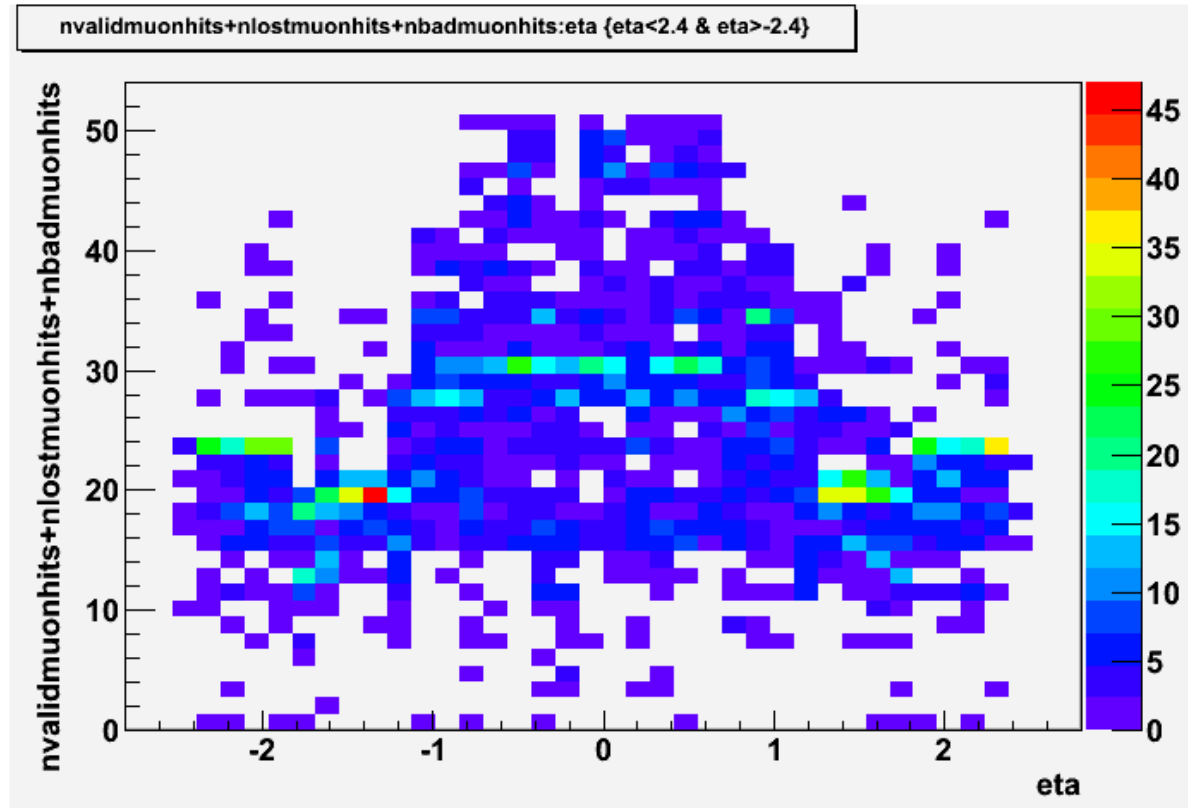


Barrel: Drift-Tubes (DT), Resistive-Plate-Chambers (RPC)
End-Caps: Cathode-Strip-Chambers (CSC), Resistive-Plate-Chambers (RPC)

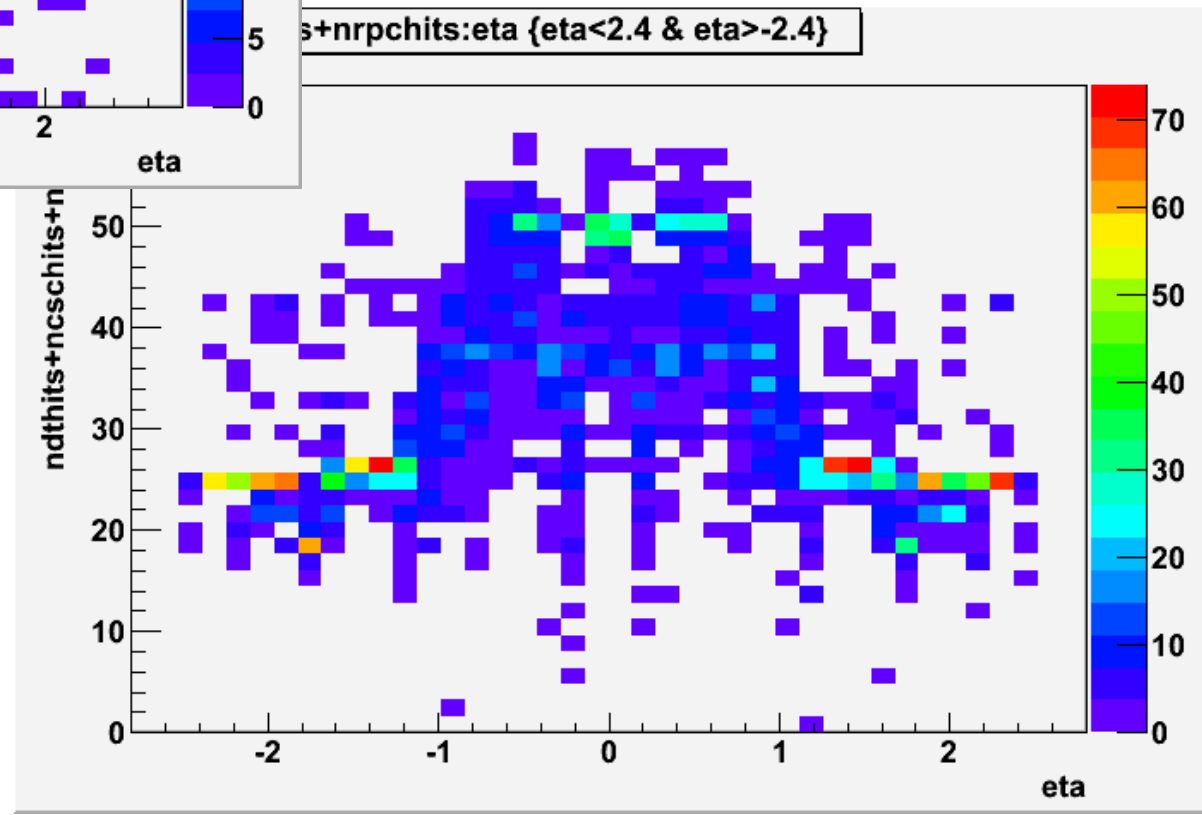
DT: $|\eta| < 1.2$
CSC: $|\eta| [0.9, 2.4]$
RPC: $|\eta| < 2.4$

Muon hits:

Reco_STA:
valid_hits

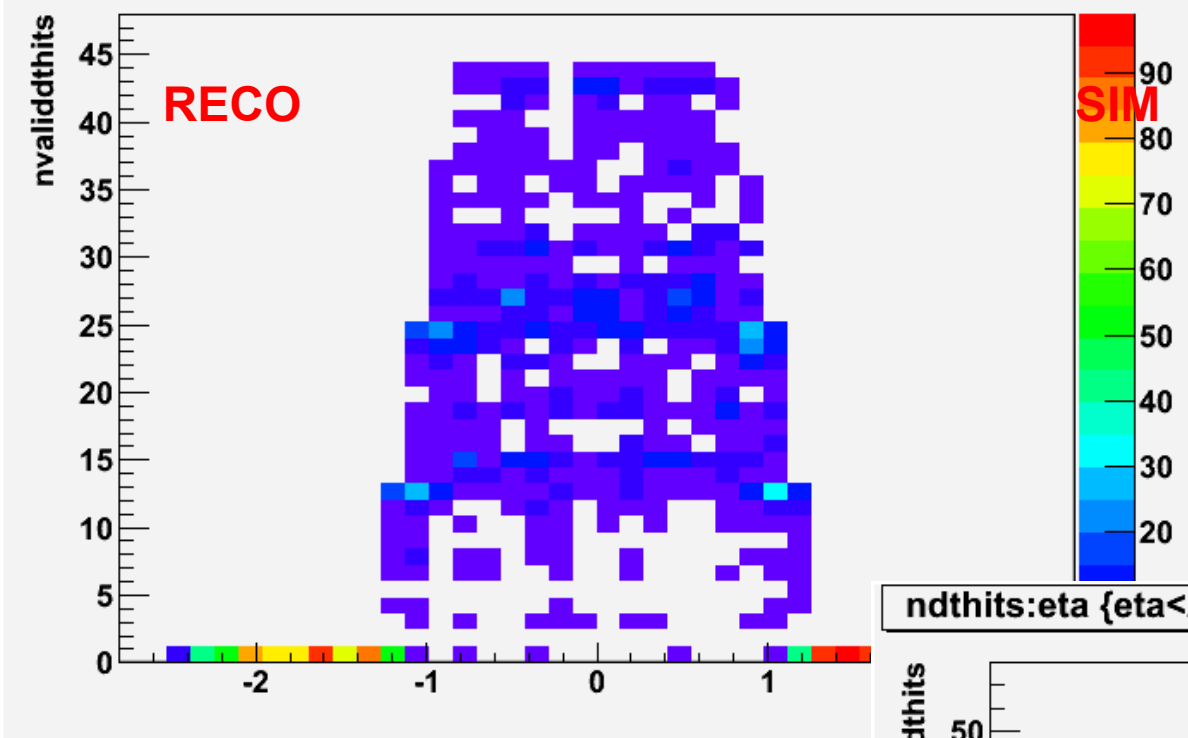


Sim_STA

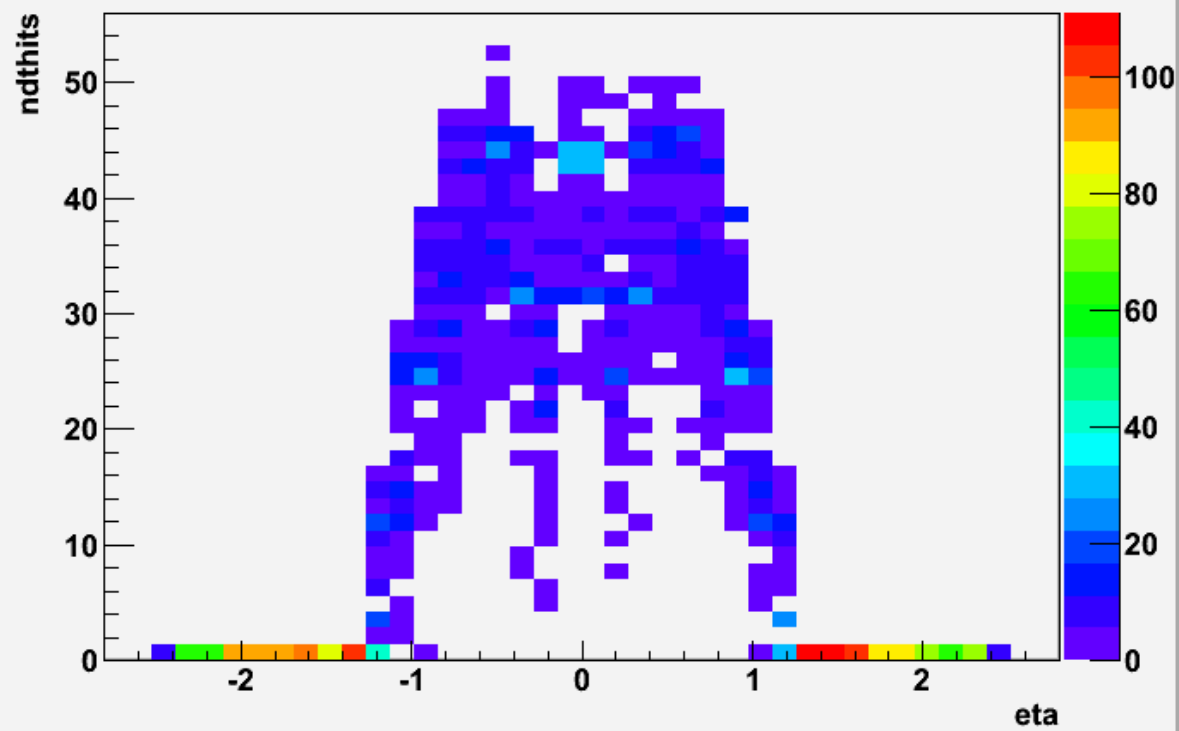


DT hits (max 48, $|\eta| < 1.2$)

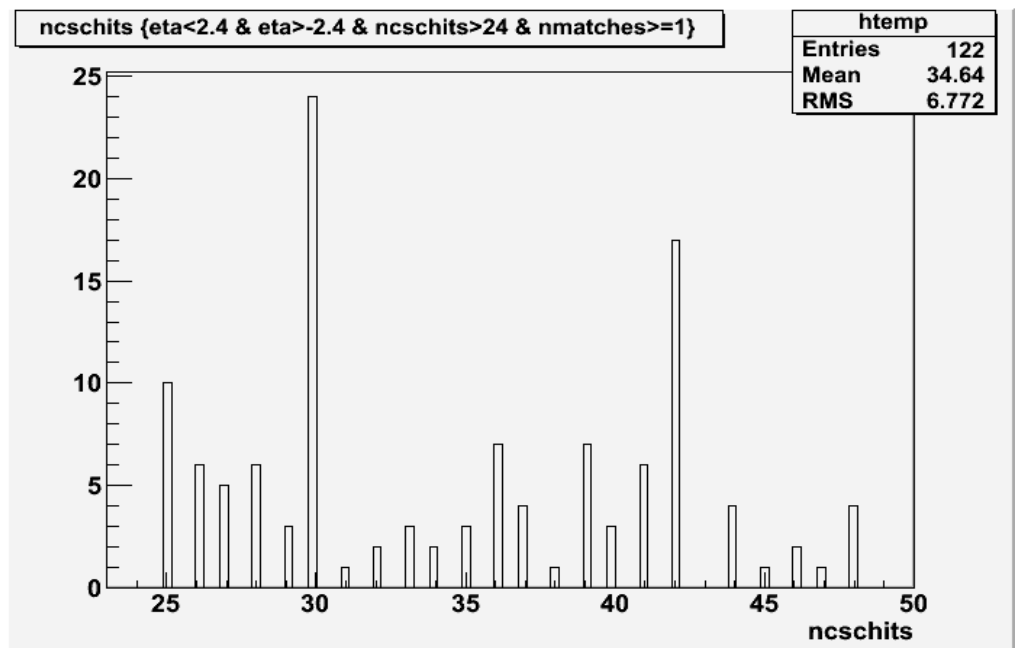
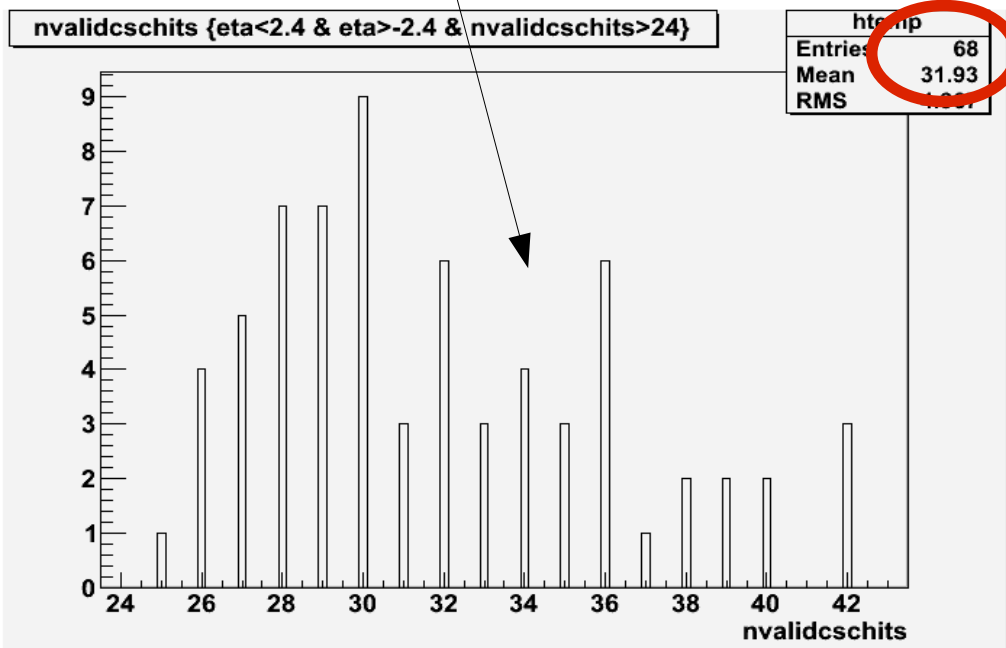
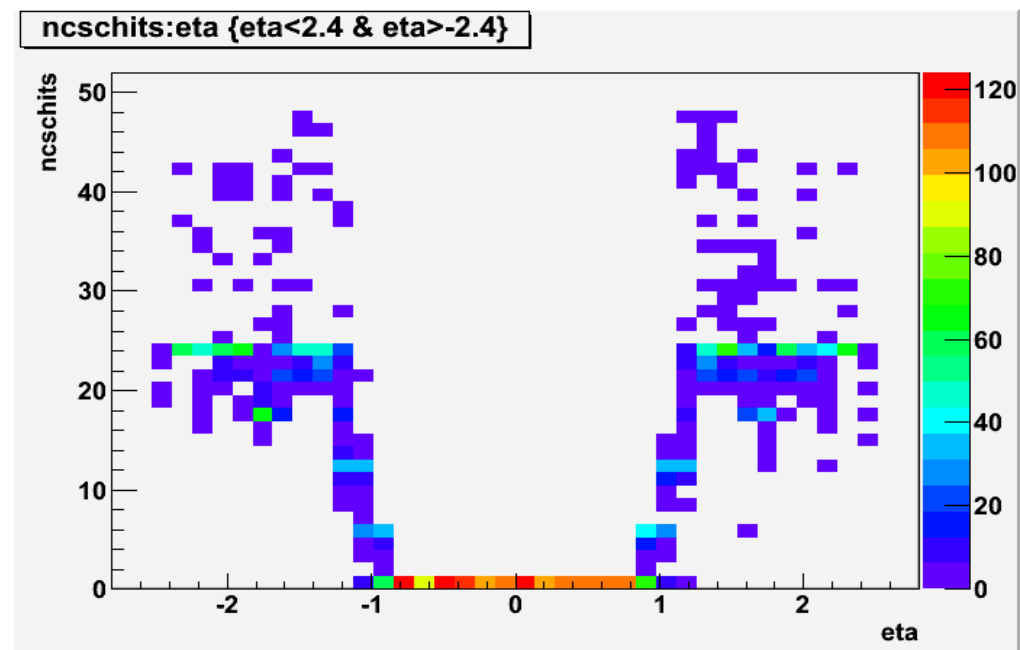
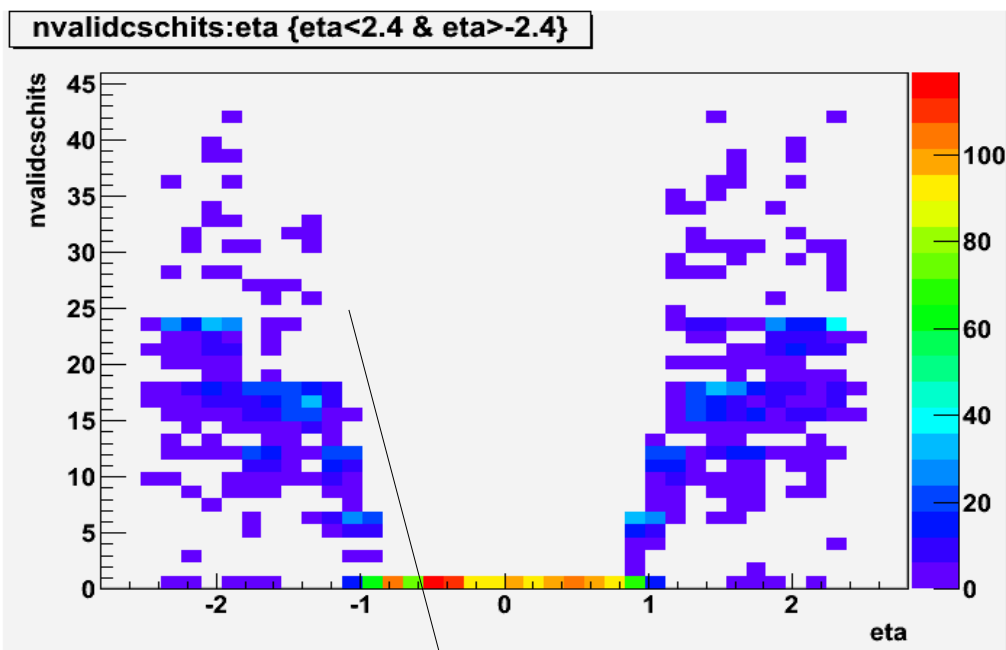
nvaliddthits:eta {nmatches>=1 & eta>-2.4 & eta<2.4}



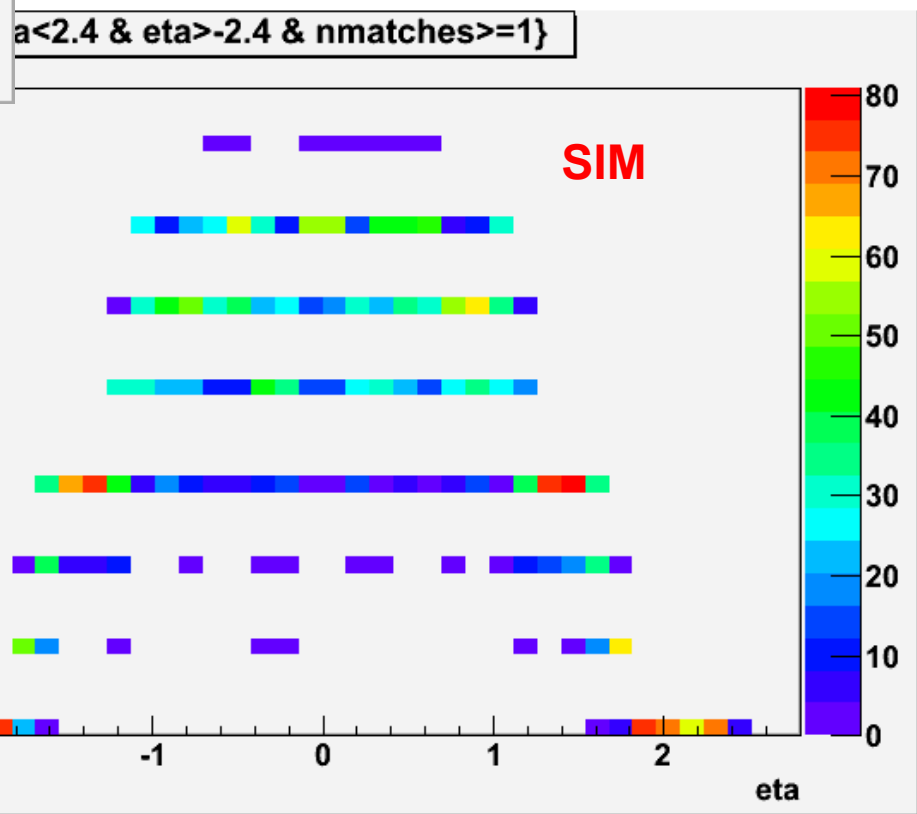
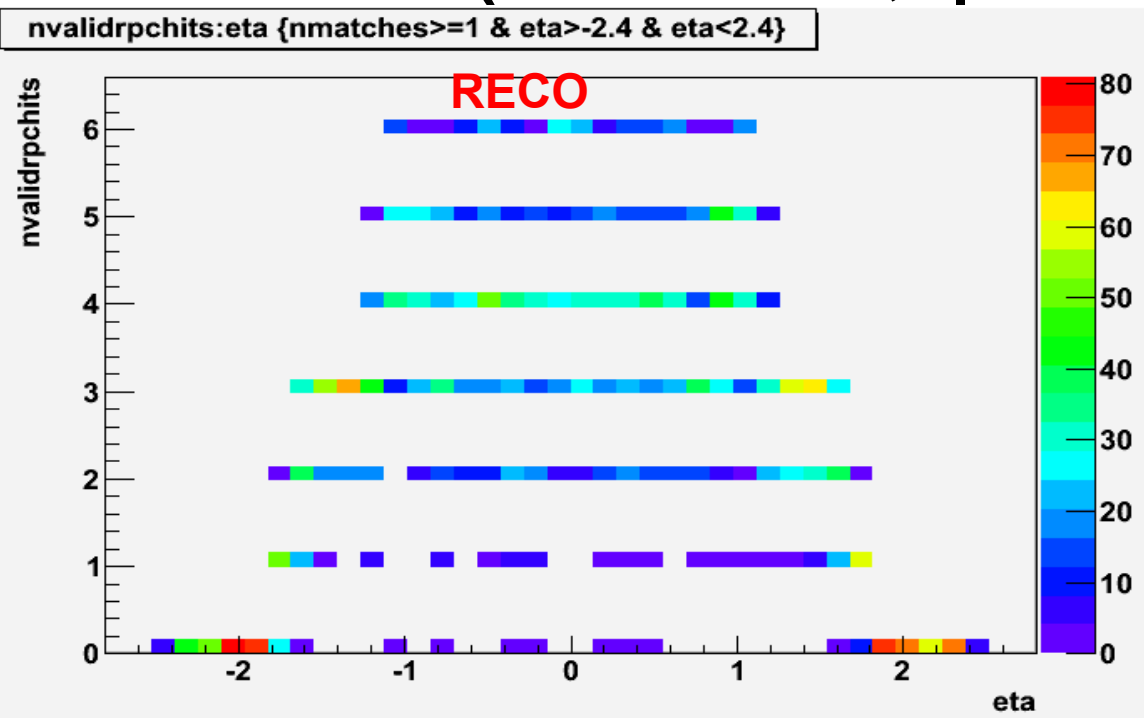
ndthits:eta {eta<2.4 & eta>-2.4}



CSC hits (24 hits, $|\eta| \in [0.9, 2.4]$)

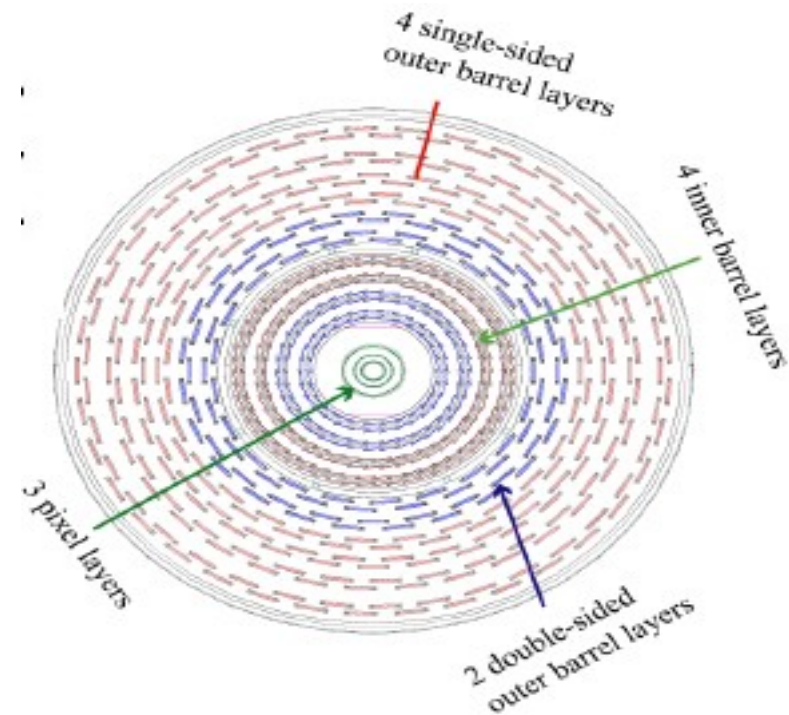


RPC hits(4/6 hits, $|\eta| < 2.4$)

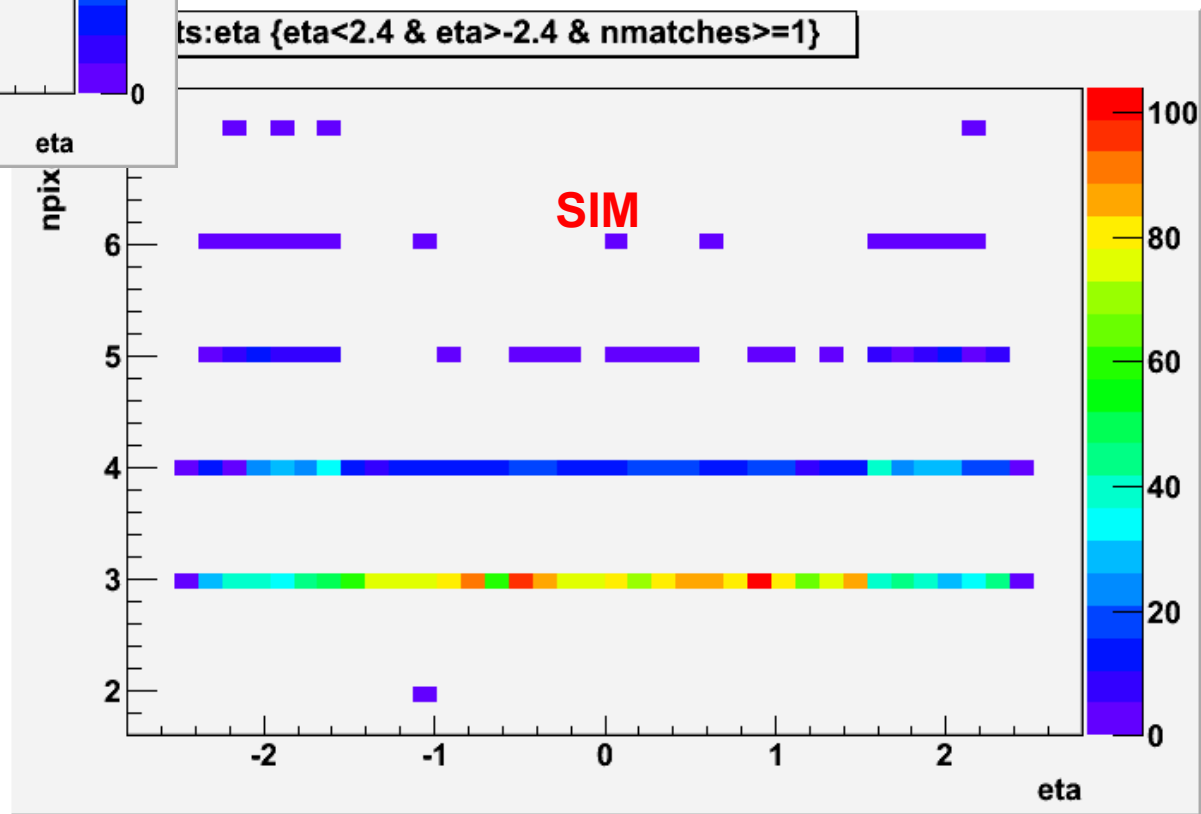
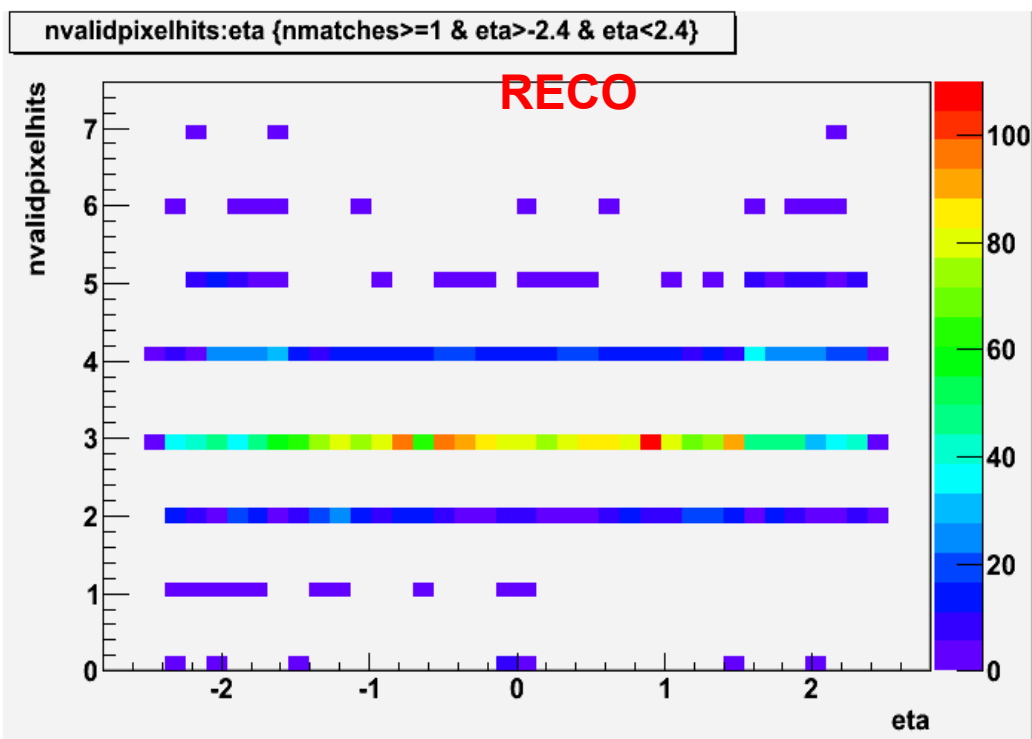


TRK:

- Pixel:
 - 3 layers \rightarrow 3 hits (max 6, including overlaps)
- Strips:
 - 8 single sided layers \rightarrow 8 hits
 - 2 double layers \rightarrow 4 hits
 - \Rightarrow 12 hits (max 24, including overlaps)

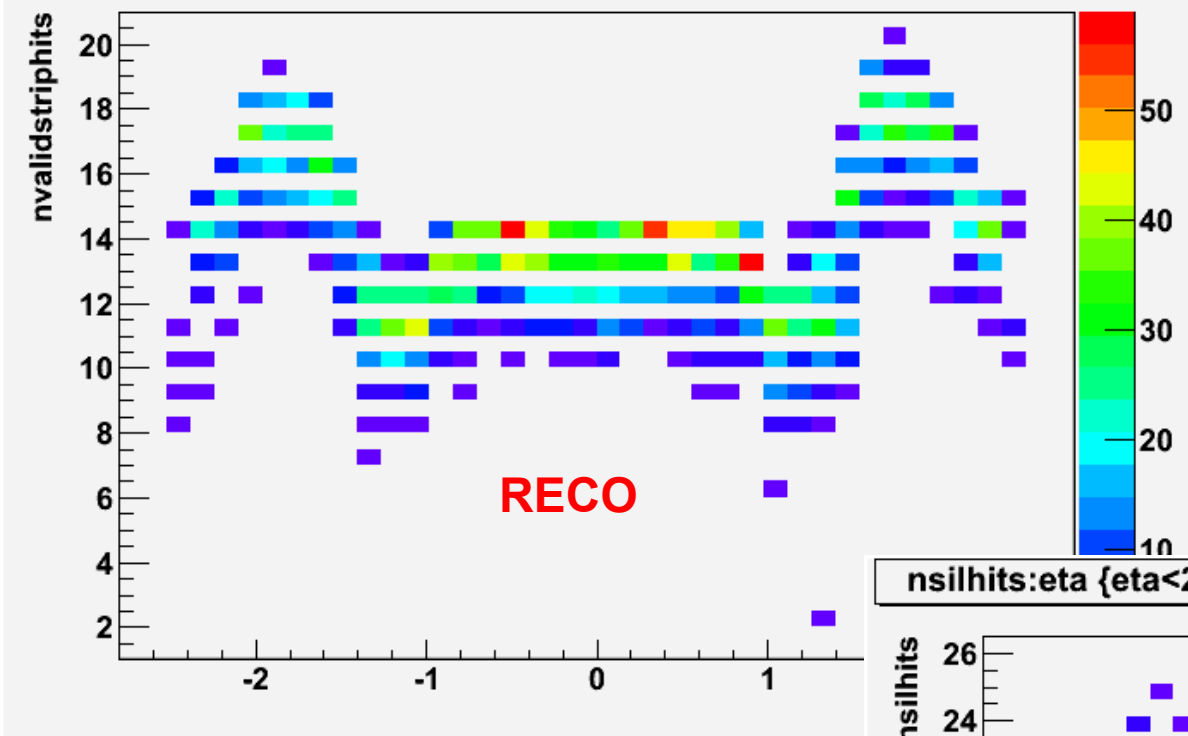


Pixels (max 6 hits)

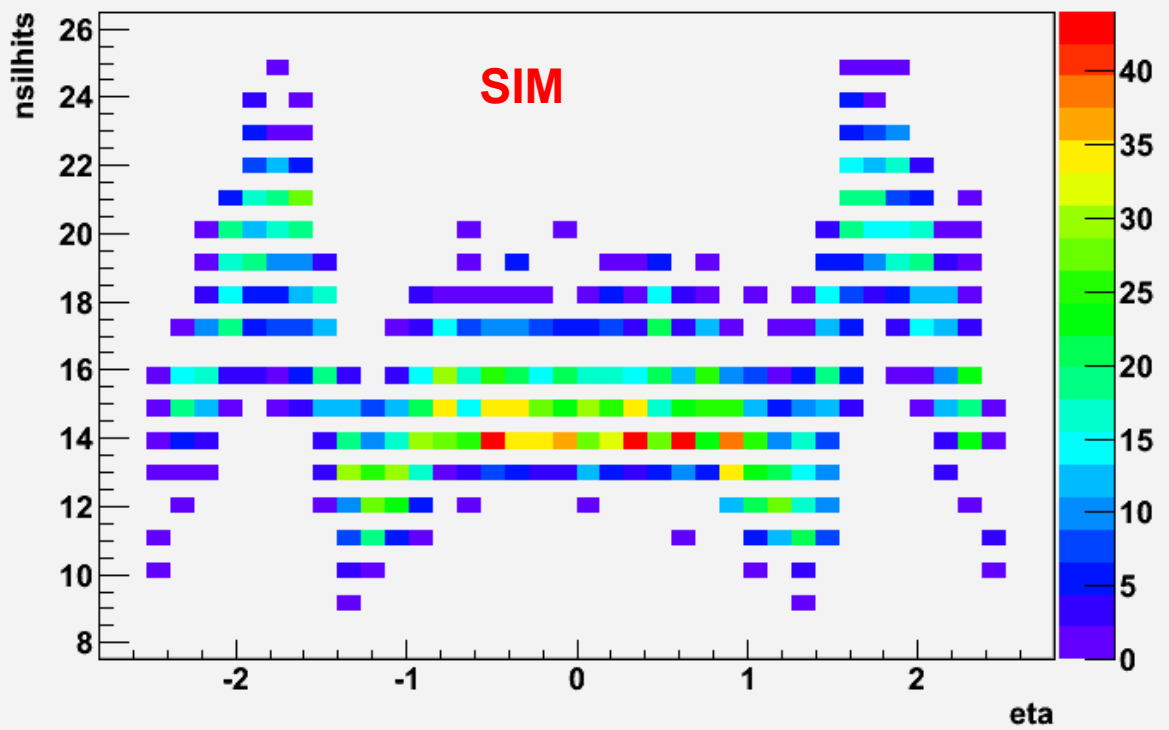


Silicon (max 24)

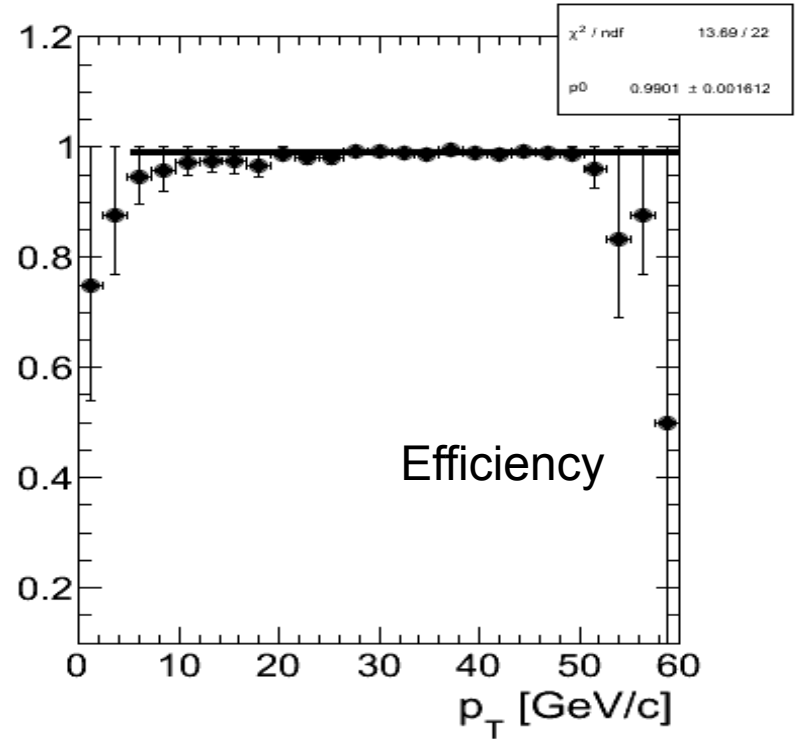
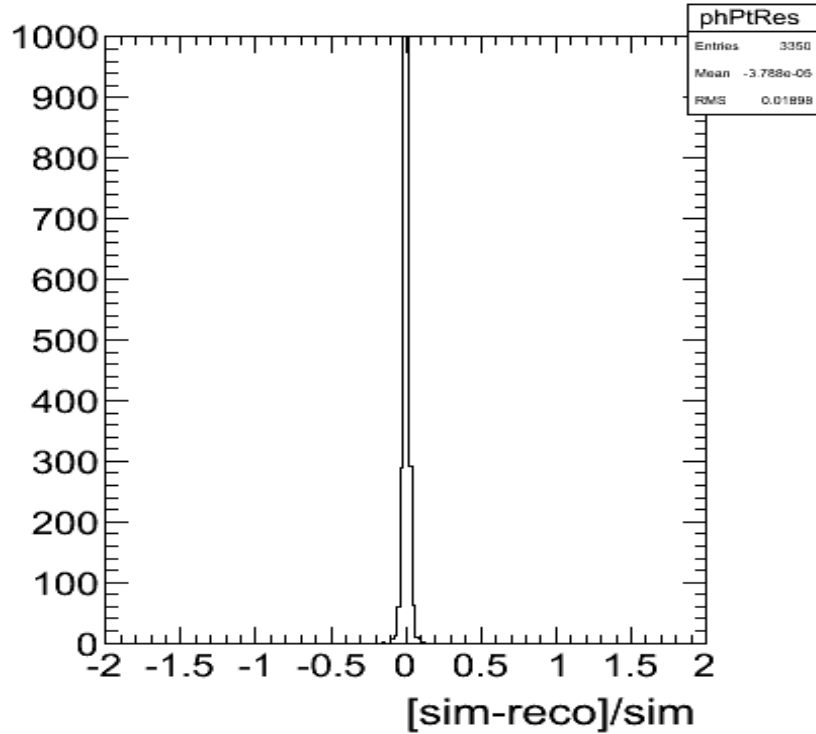
nvalidstriphits:eta {eta<2.4 & eta>-2.4 & nmatches>=1}



nsilhits:eta {eta<2.4 & eta>-2.4 & nmatches>=1}



- Matching



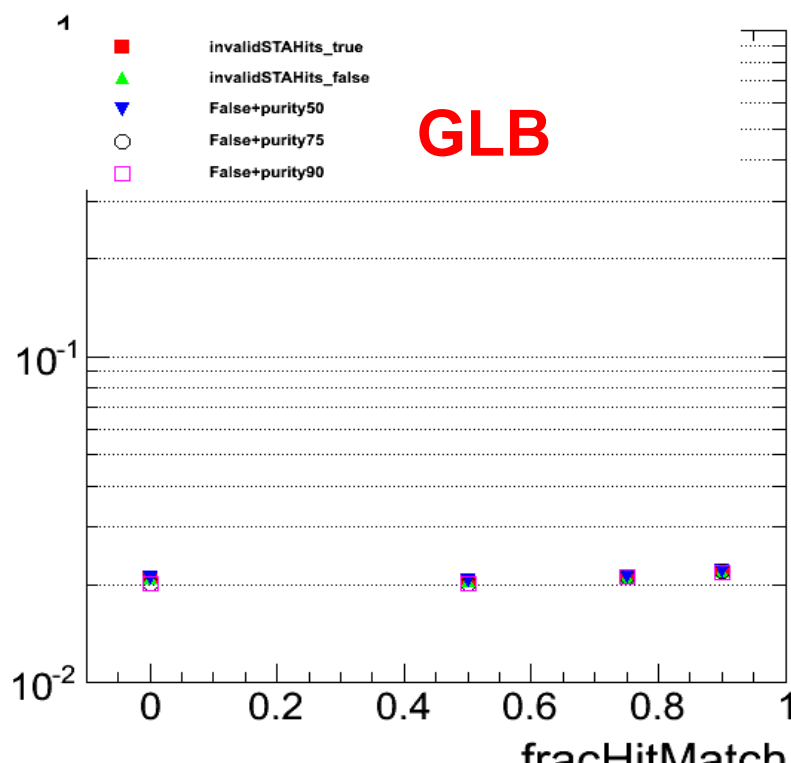
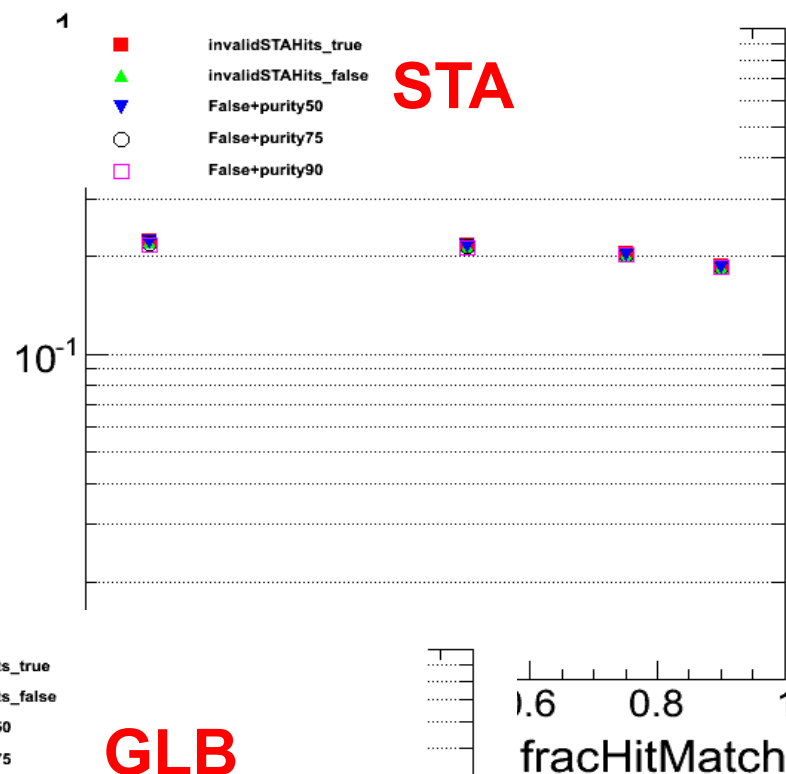
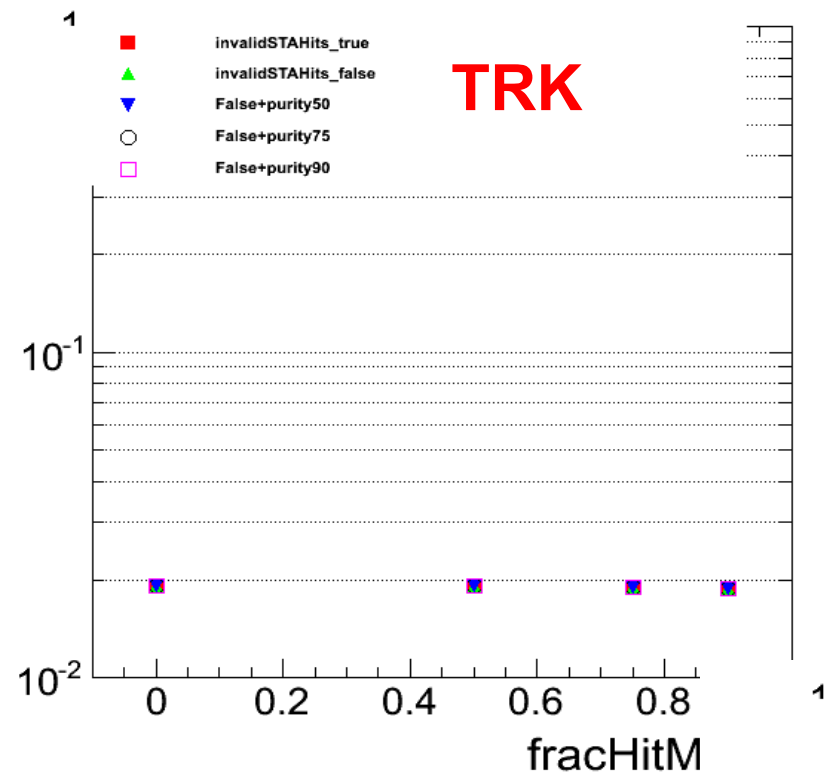
- different cuts combinations
- make resolution and plot Sigma
- calculate efficiency (sim_matched/sim_all), fit , and plot the p0
- done for both pp-trking and hi-trking (on twiki both, here just HI)

Notations:

-->fracHitMatch = sim_hits_matched/sim_hits_all (stored in the sim2reco map)

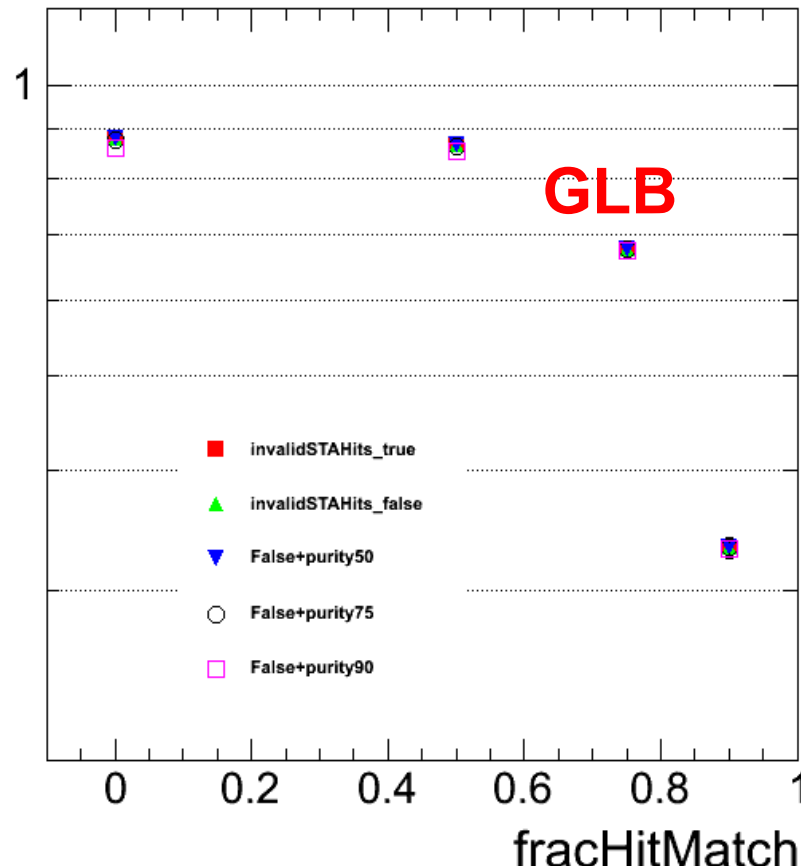
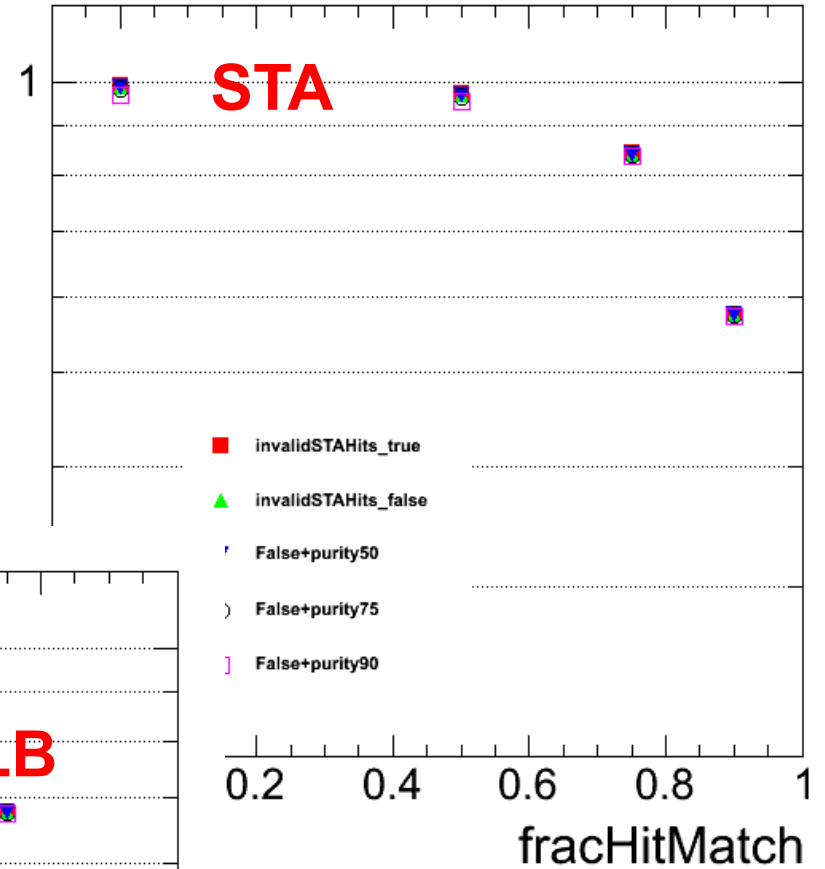
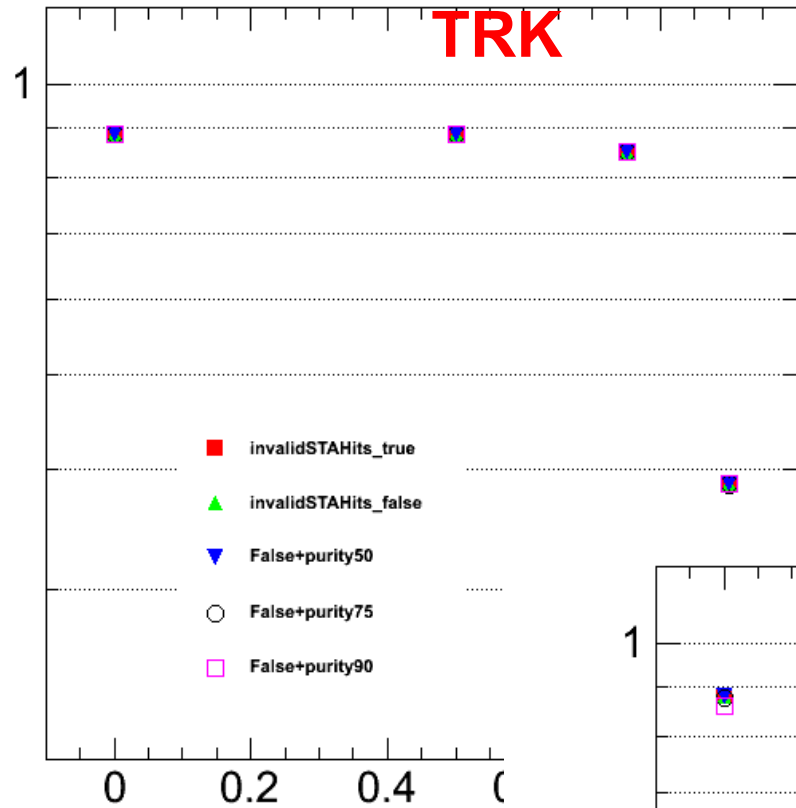
-->purityCut = sim_hits_matched/reco_hits_all

Resolution

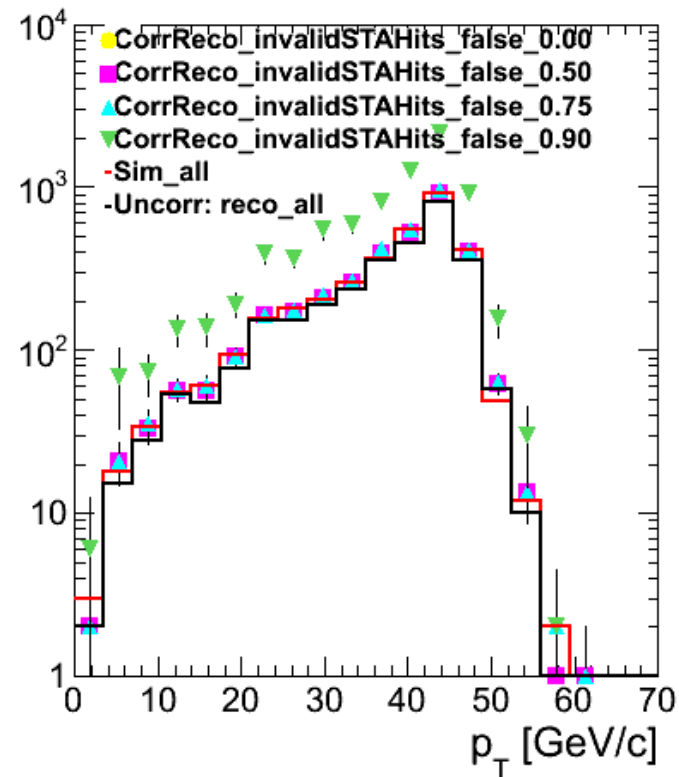
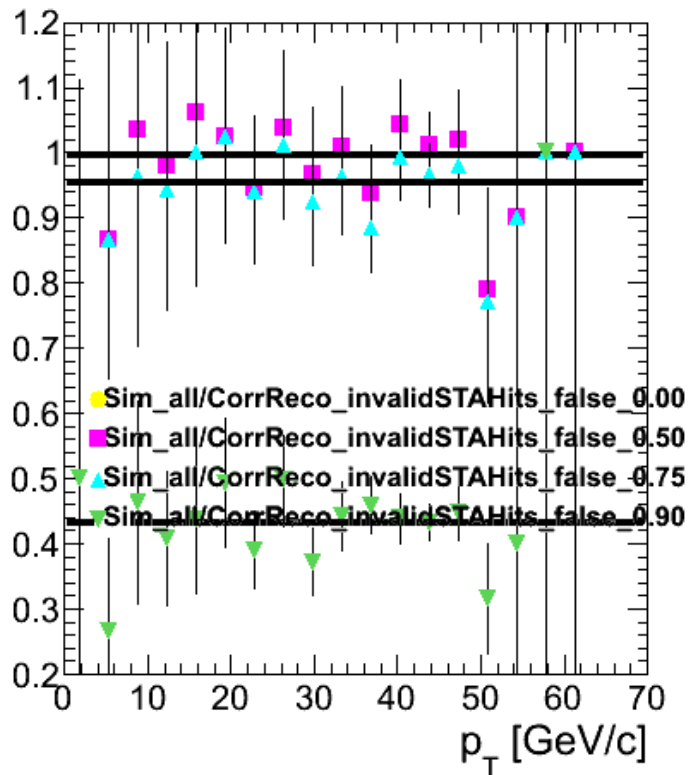


→ red & green, no purityCut
→ +purityCut:50%,75%,90%

Efficiency

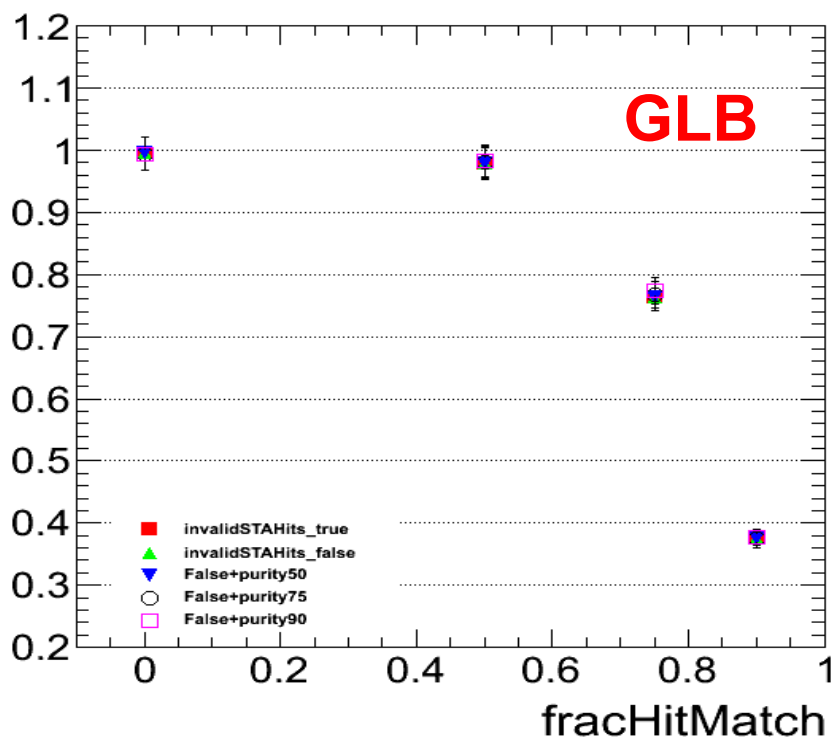
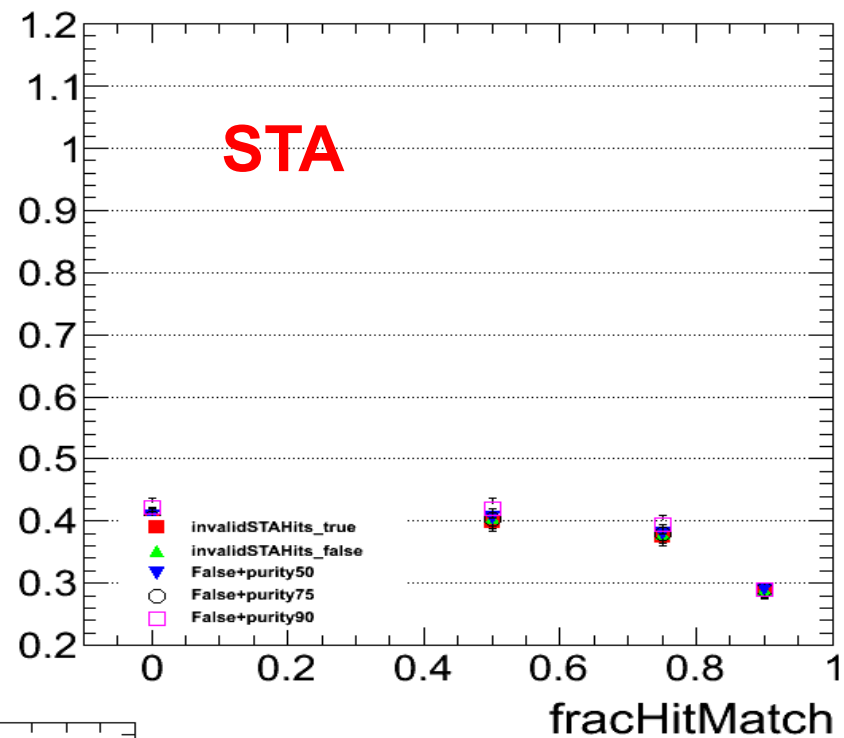
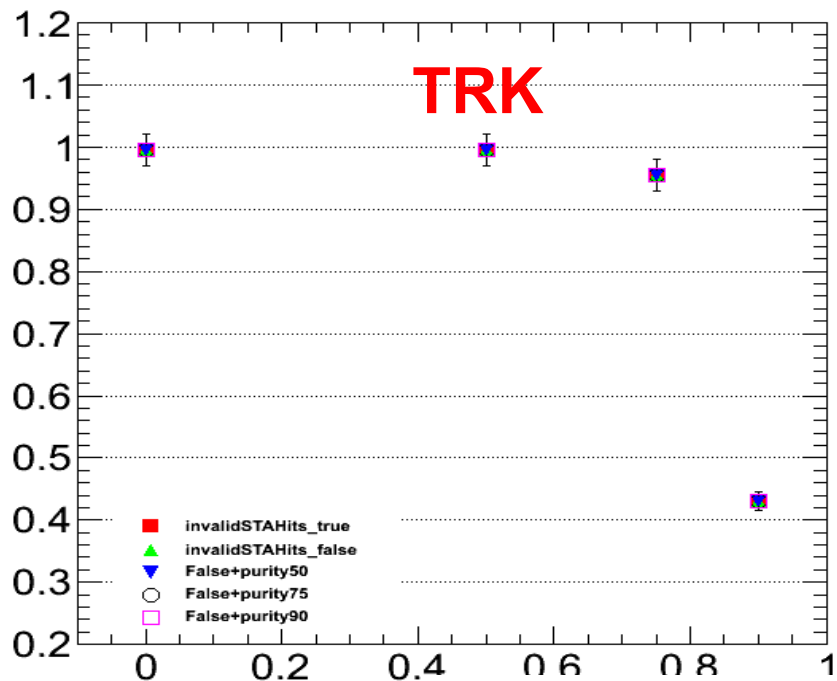


Correction: Fake/Efficiency

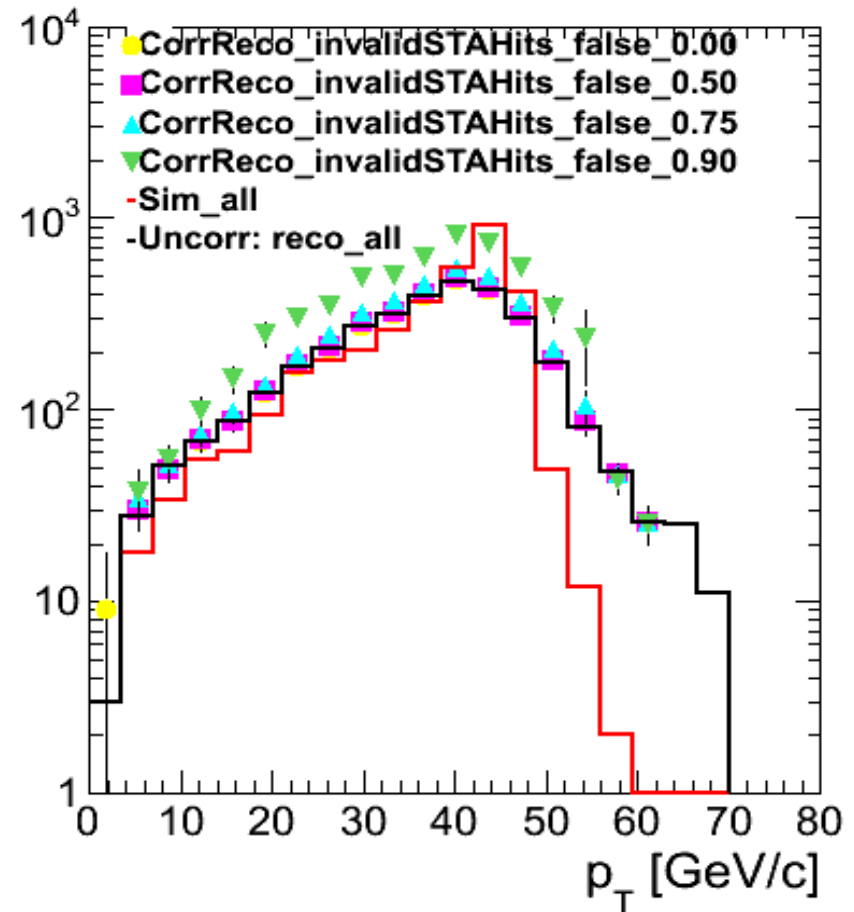
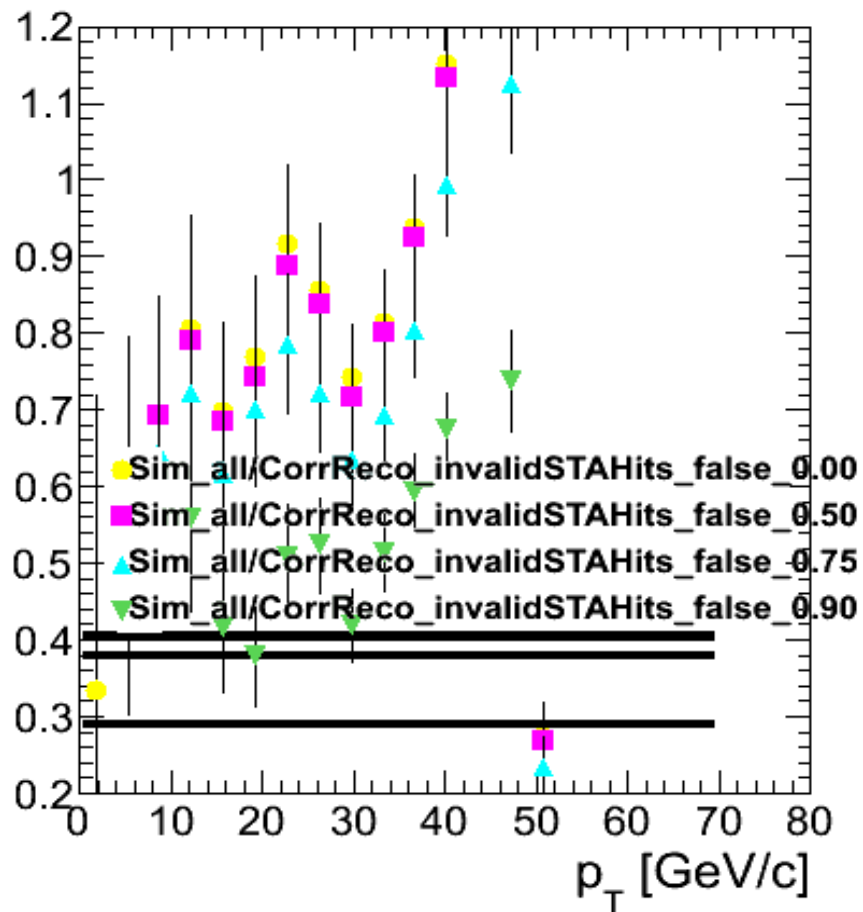


→ compare sim spectra, with reco*correction (make a ratio and fit)

Fit(reco_corrected/sim)



STA --- effect of mom resolution



Conclusions:

- The combinations of (purity, quality)= (any,0-0.5) are the ones that give correct results;
 - But NOT for STA_s, where the mom resolution poor, makes the corrections to be wrong
 - Suggested working point (0.75, 0.5), (for having a low fakeRate in HI)
- The variation in results, will make for the systematic errors from corrections

- Miscellaneous:
 - #reco_hits_CSC > max technical possible (for high_pT muons): ~3% of the tracks (see on Twiki: back-2-back muons in phi, with similar pT):
 - <https://twiki.cern.ch/twiki/pub/Main/HbyHm/csc.pdf>