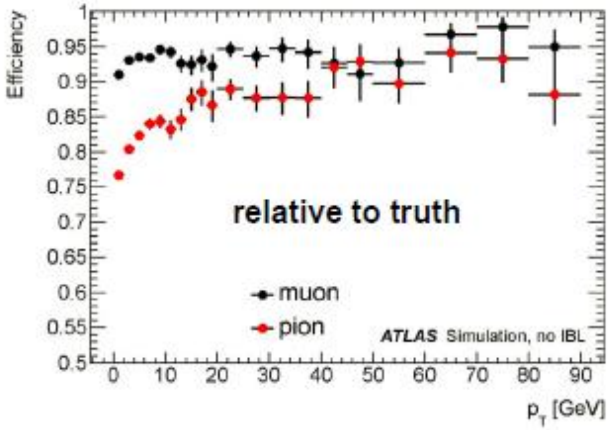
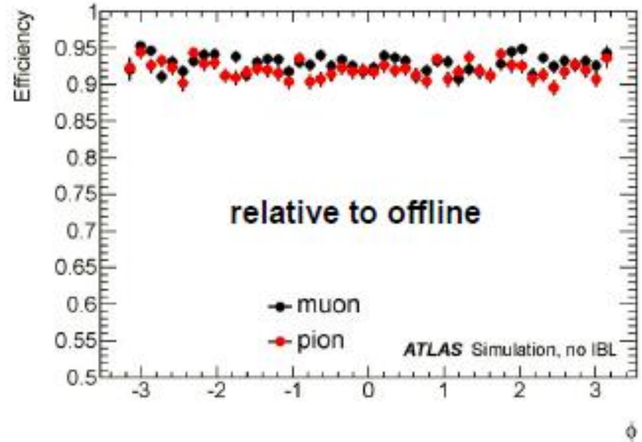
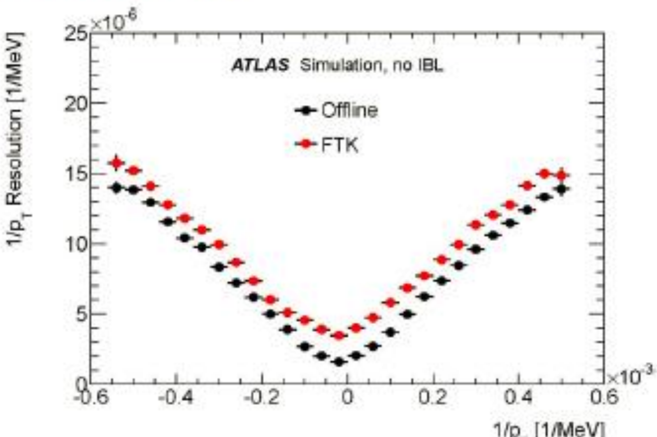
Single Particles

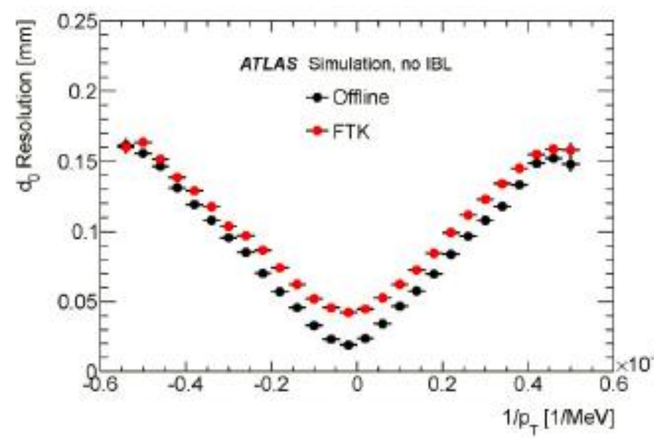
- **Efficiency**





- **Resolution**

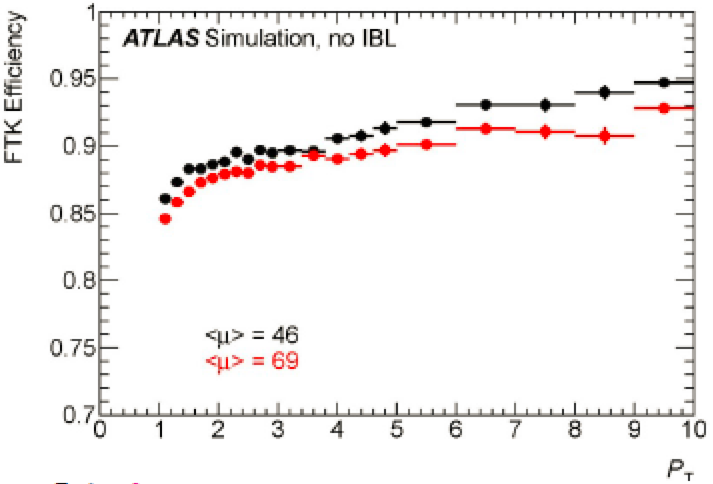




- **We discovered a decrease in the resolution in the endcap regions.**
  - **Results from our training of FTK fitting constants on a sample of tracks flat in curvature ⇒ most tracks have p_T near 1 GeV/c where there is large multiple scattering broadening in the endcaps.**
  - **Using a training sample of $p_T > 3$ GeV/c greatly improves the resolution.**
- **The z_0 resolution is worse than we have seen in the past. We expect to find the cause and fix it.**
- **All results shown in the TDR are with the poorer resolution noted the two bullets above, so in the future the results can only improve.**

Tracks in high $\mathcal{L}$ samples

- **Efficiency in $t\bar{t}$ events**
  - relative to offline tracks



- **Fake rate (not matched to truth) in $H \rightarrow \tau\tau$ events.**

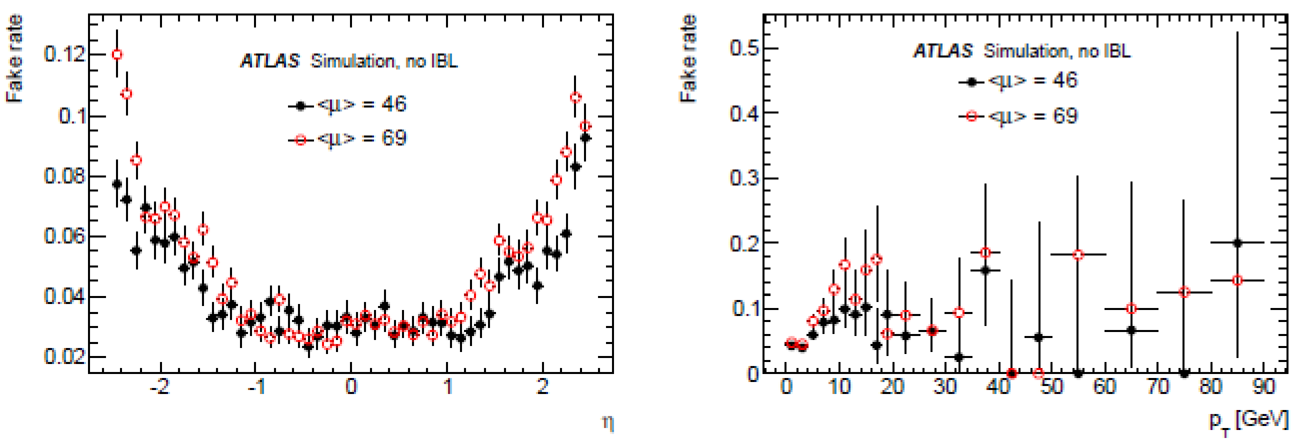
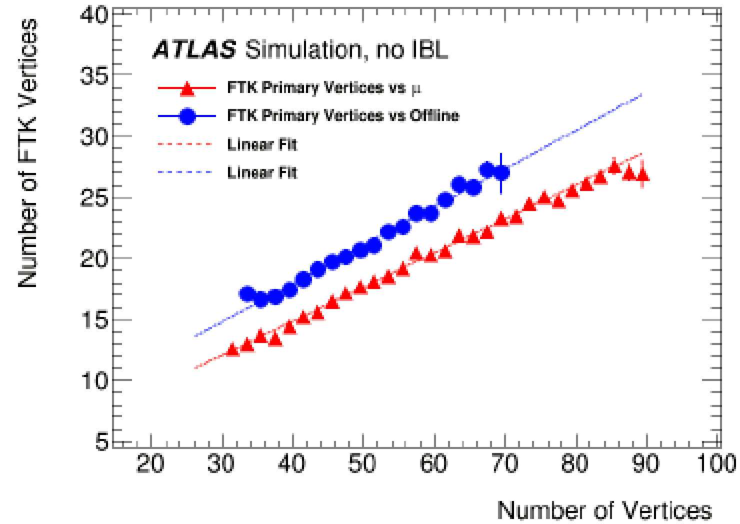


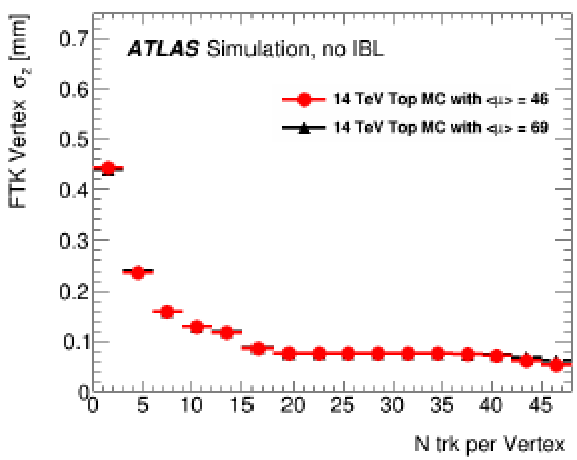
Figure 11: Fraction of FTK tracks not matched to truth as a function of η (left) and p_T (right). Both the 46 (black) and 69 (red) simultaneous interactions samples are shown.

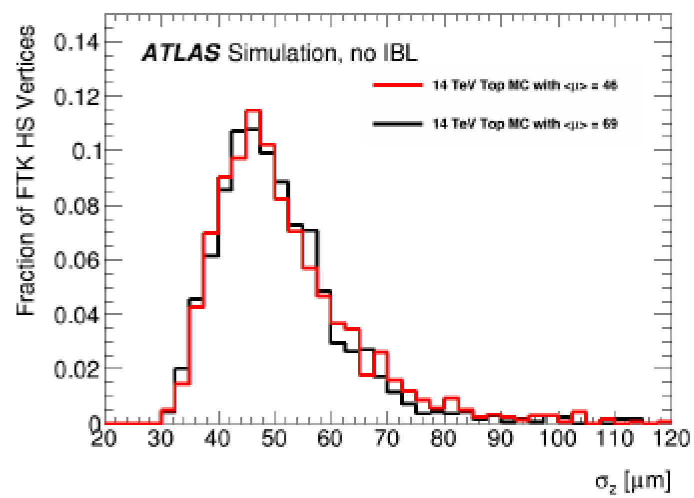
Primary Vertex Finding

- **Pileup vertices vs. true vertices**
  - FTK tracks: $p_T > 1$ GeV/c

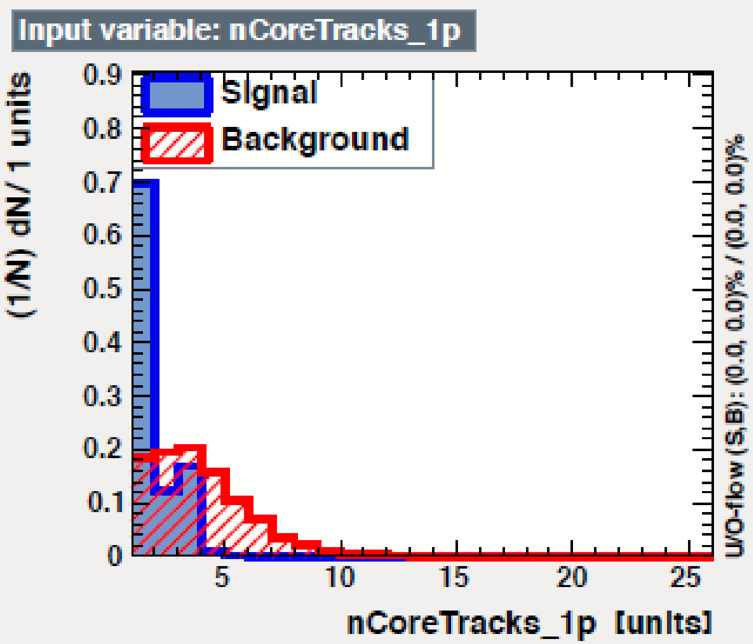


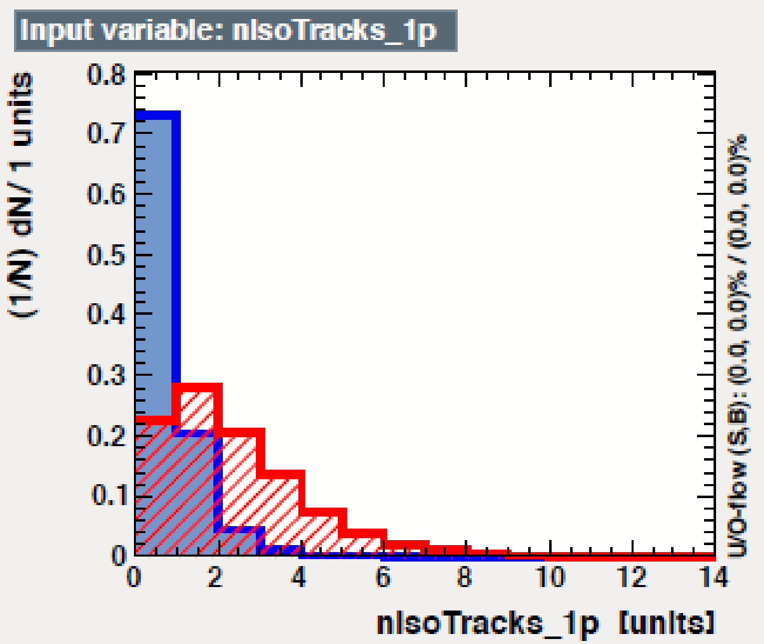
- **Hard scattering vertex in $t\bar{t}$ events**
  - FTK efficiency @ 46 pileup = (98.1 ± 0.4)% **(offline: 99% @ 40)**
  - Good z_0 resolution:

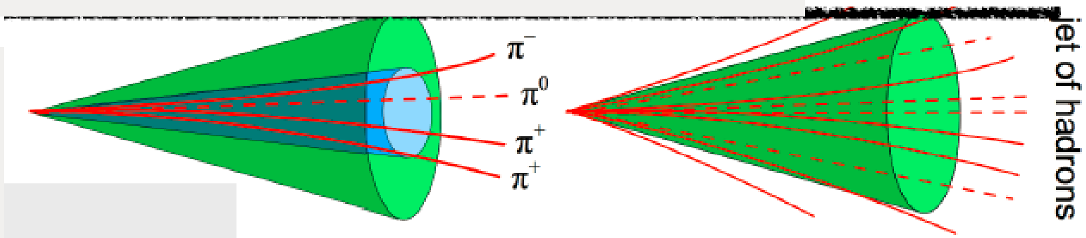




TAUS







- 1 Core Track per 1 prong
- 2or 3 core tracks per 3 prong

We keep 96% of the signal and throw away

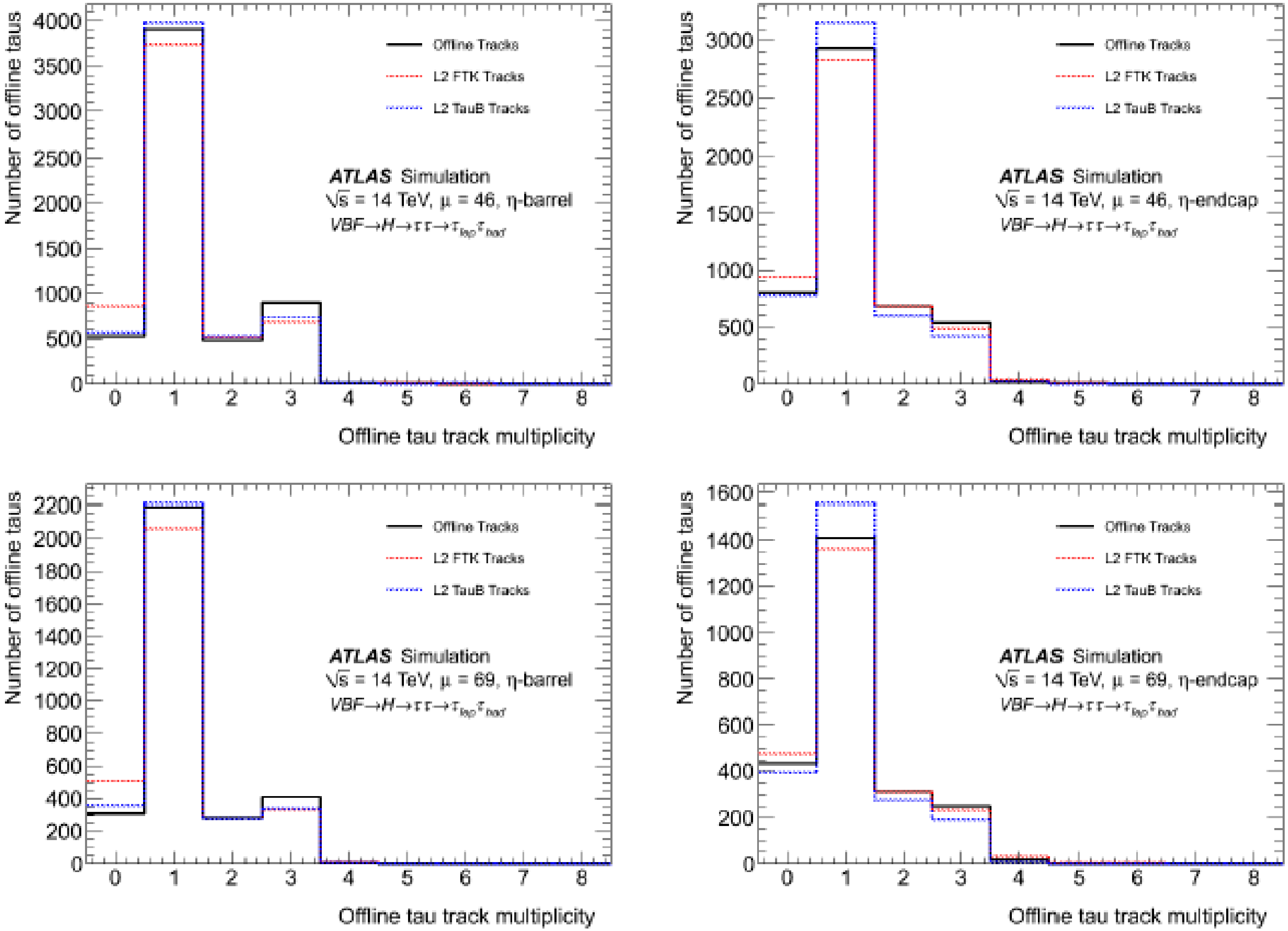
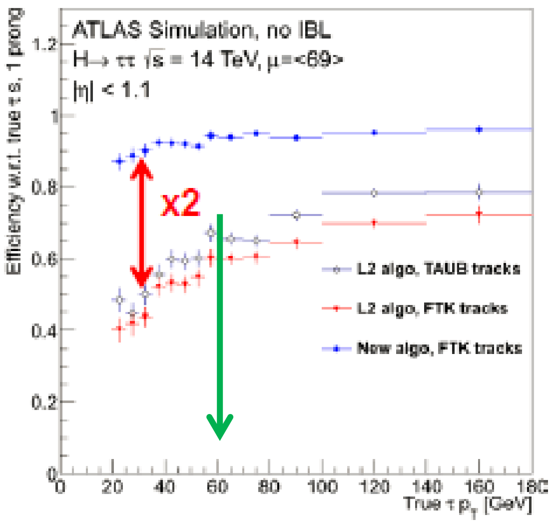
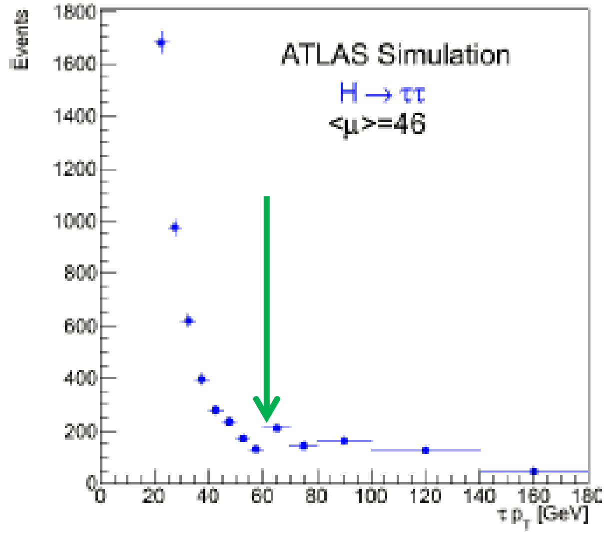
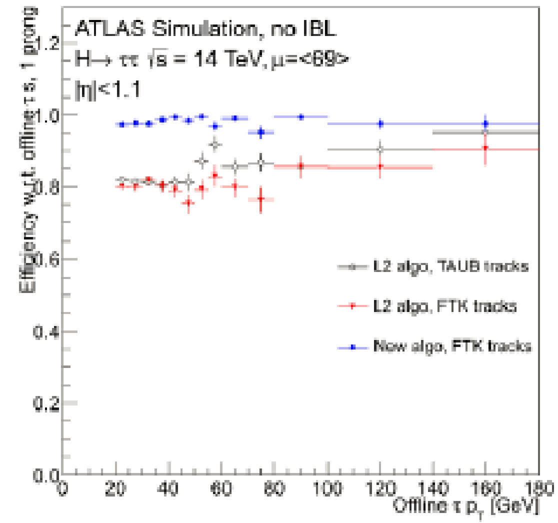


Figure 34: Number of tracks inside the signal cone ($\Delta R = 0.1$ a from an offline reconstructed τ with a medium BDT requirement) for offline tracks (black), tauB track(blue) and FTk tracks (red) for $\eta < 1.1$ (left) and $\eta > 1.1$ (right). The upper plots are for the $H \rightarrow \tau\tau$ $\mu = 46$ sample and the lower plots are with the $\mu = 69$ sample.

- **Efficiency relative to true τ's & offline selected τ's**



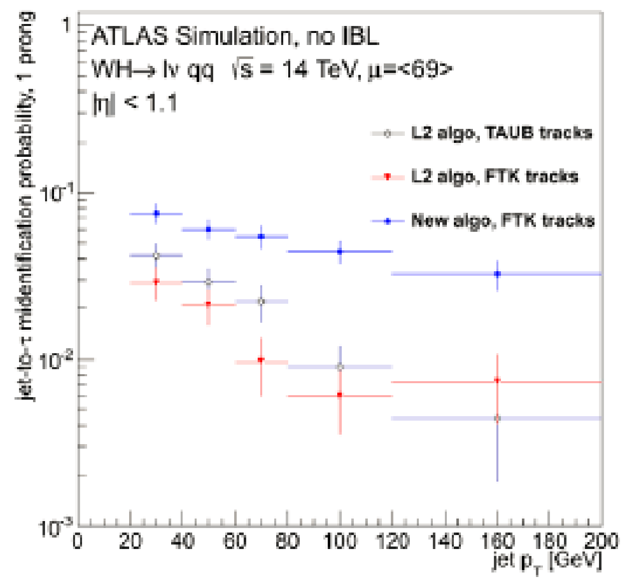


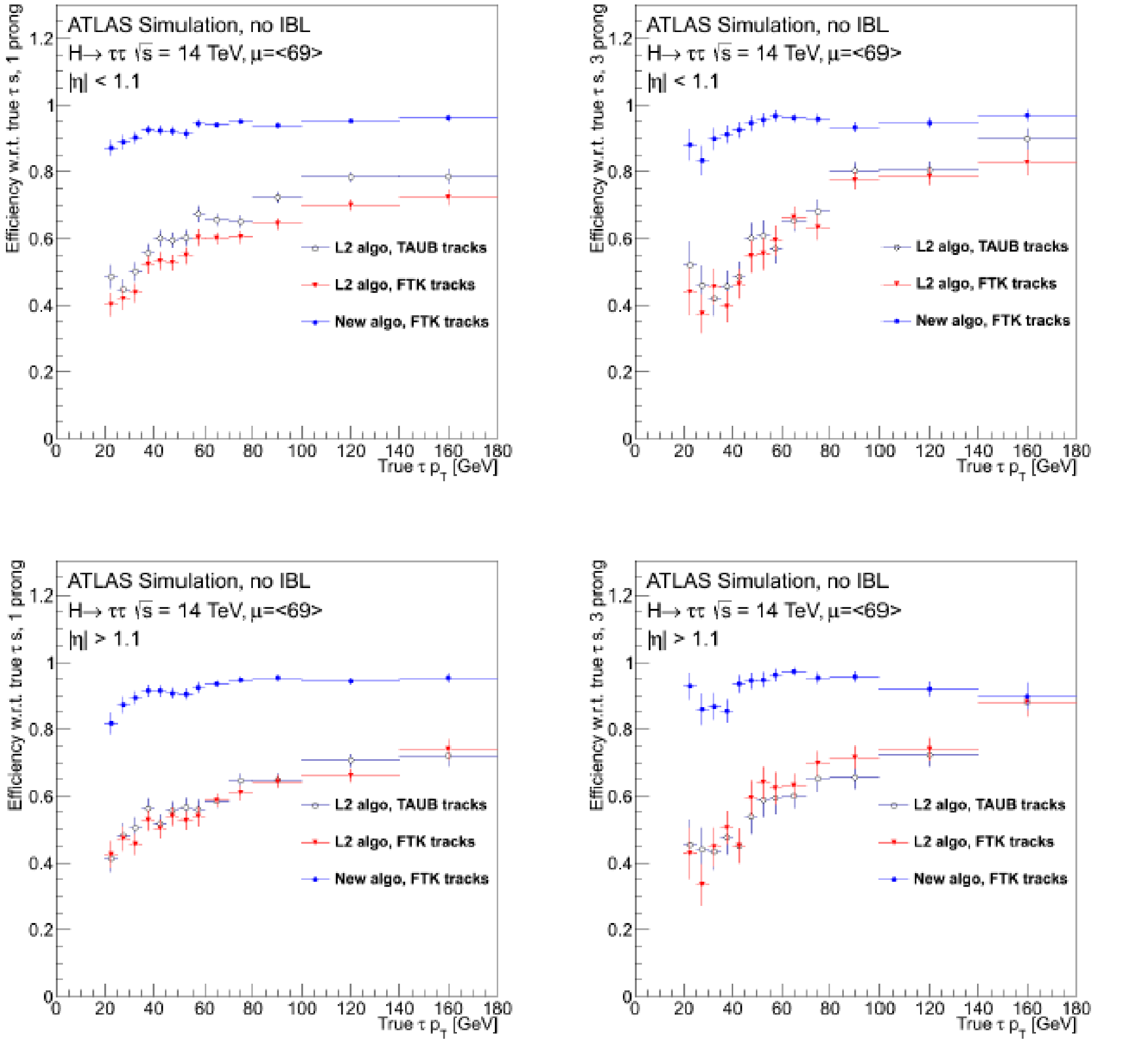


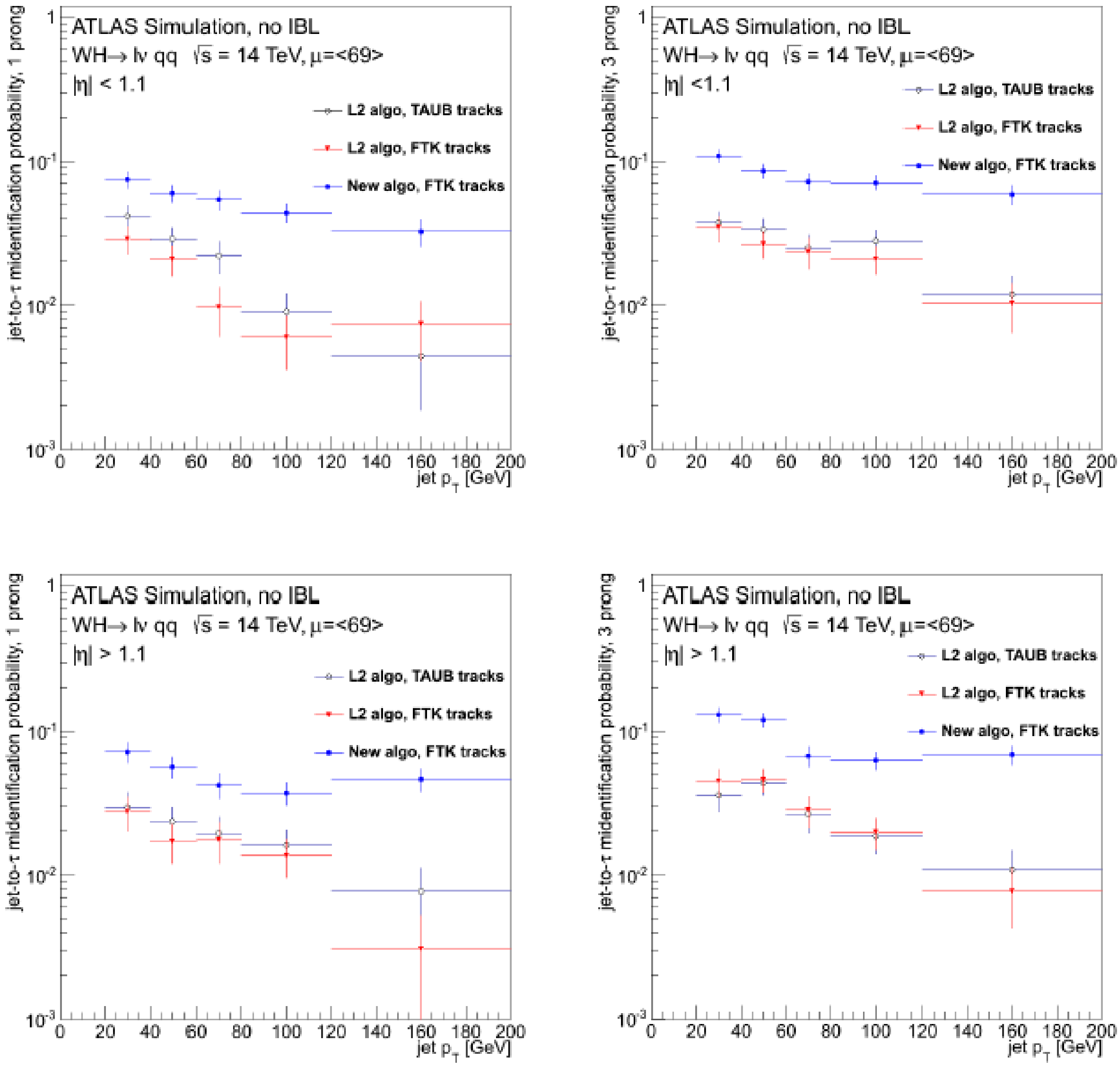
  - The offline selection has to be optimized for the track-only L2 selection.

- **The rejection is not as good, but sufficient to pass the event to the Event Filter.**

1-prong



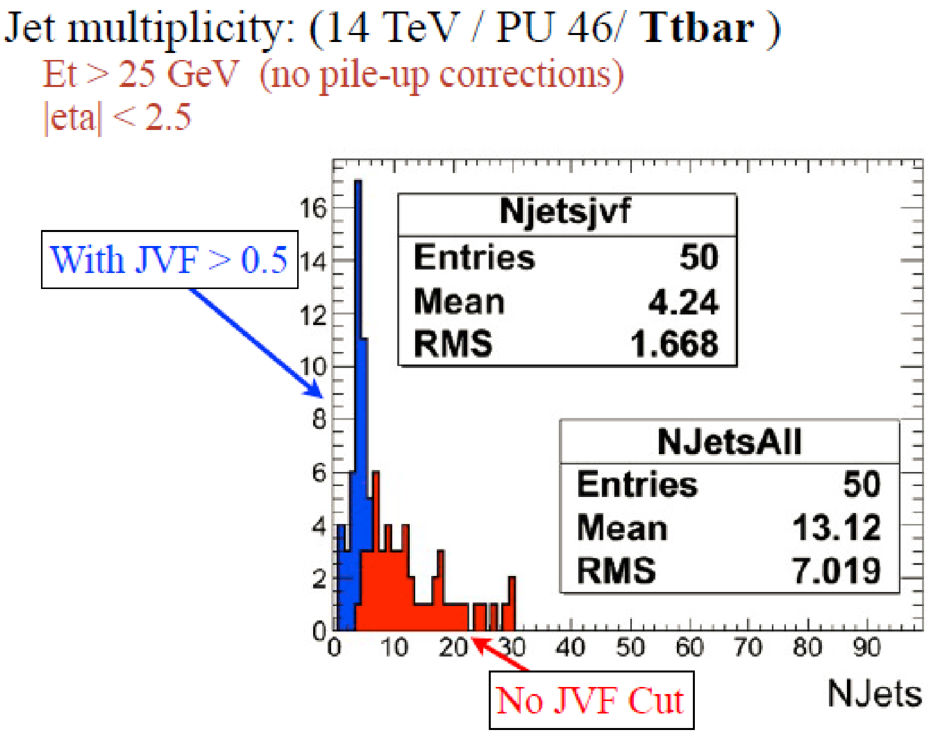

ATLAS Simulation, no IBL
H→ ττ √s = 14 TeV, μ=<69>
|η| < 1.1
Efficiency w.r.t. true τ s, 1 prong
True τ p_T [GeV]
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
ATLAS Simulation, no IBL
H→ ττ √s = 14 TeV, μ=<69>
|η| < 1.1
Efficiency w.r.t. true τ s, 3 prong
True τ p_T [GeV]
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
ATLAS Simulation, no IBL
H→ ττ √s = 14 TeV, μ=<69>
|η| > 1.1
Efficiency w.r.t. true τ s, 1 prong
True τ p_T [GeV]
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
ATLAS Simulation, no IBL
H→ ττ √s = 14 TeV, μ=<69>
|η| > 1.1
Efficiency w.r.t. true τ s, 3 prong
True τ p_T [GeV]
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks

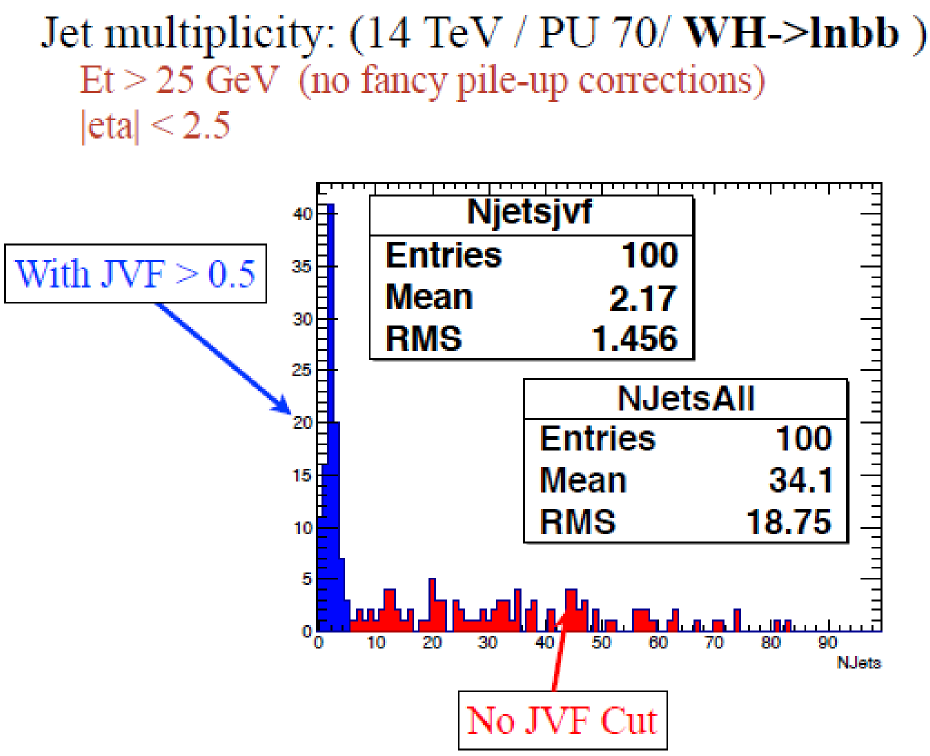

ATLAS Simulation, no IBL
WH→ lν qq √s = 14 TeV, μ=<69>
|η| < 1.1
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
jet-to-τ midentification probability, 1 prong
jet p_T [GeV]
ATLAS Simulation, no IBL
WH→ lν qq √s = 14 TeV, μ=<69>
|η| <1.1
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
jet-to-τ midentification probability, 3 prong
jet p_T [GeV]
ATLAS Simulation, no IBL
WH→ lν qq √s = 14 TeV, μ=<69>
|η| > 1.1
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
jet-to-τ midentification probability, 1 prong
jet p_T [GeV]
ATLAS Simulation, no IBL
WH→ lν qq √s = 14 TeV, μ=<69>
|η| > 1.1
L2 algo, TAUB tracks
L2 algo, FTK tracks
New algo, FTK tracks
jet-to-τ midentification probability, 3 prong
jet p_T [GeV]

NEXT: build a complete L1-L2-L3 menu.

Boosted taus…..jets in the forward/backward for VBF….

Jets enter in the tau selection





Btagging

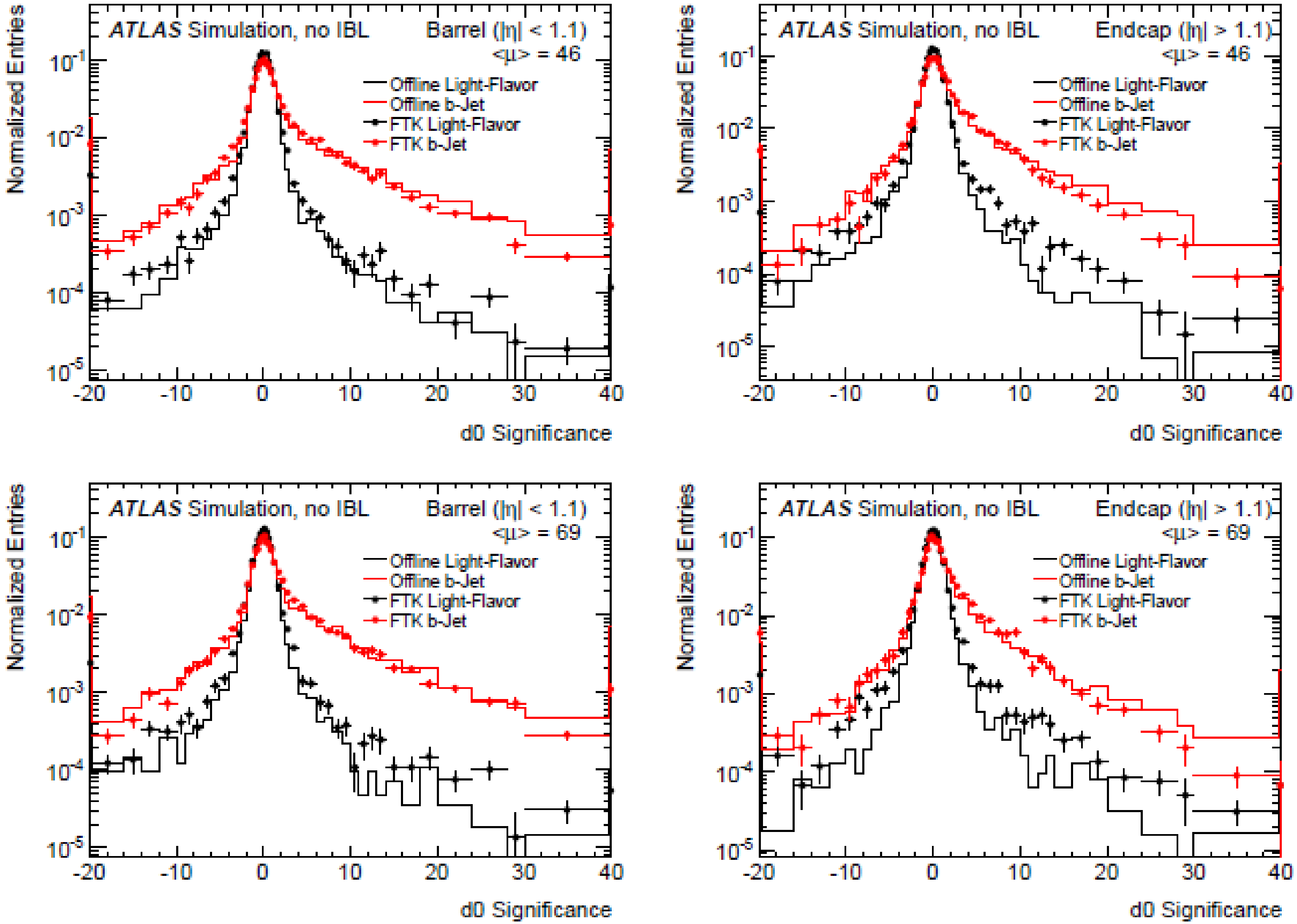
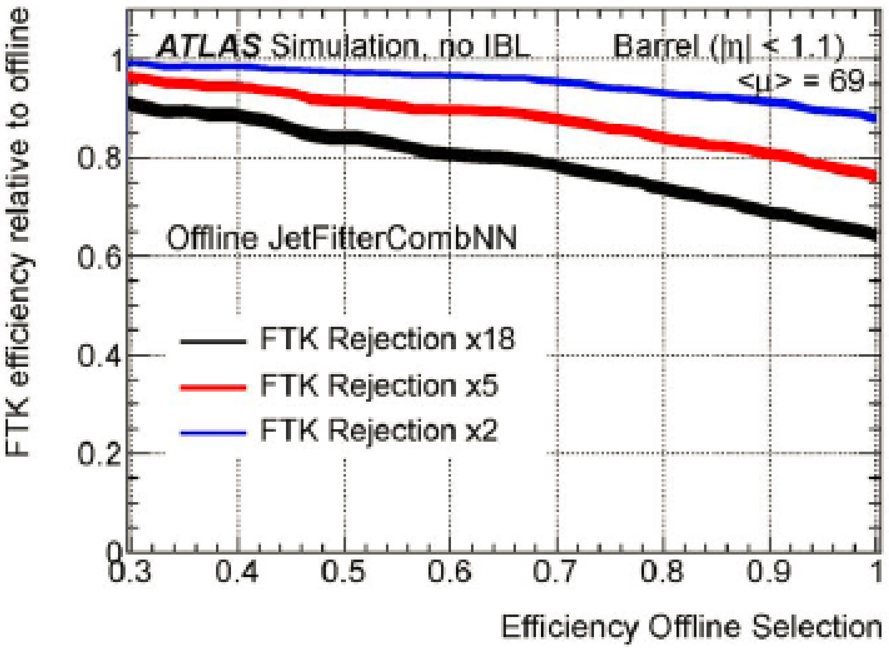
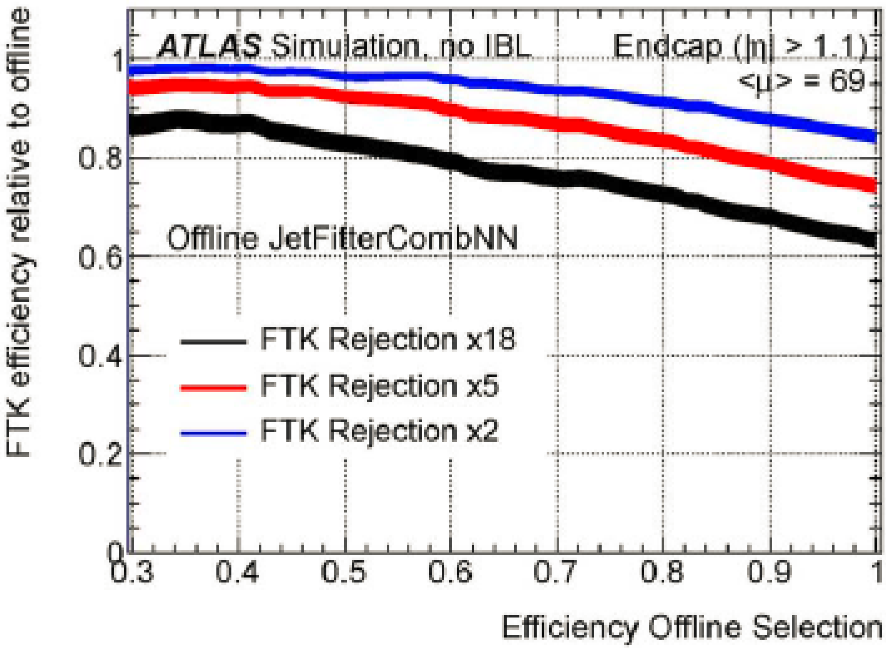


Figure 20: Transverse impact parameter significance of tracks associated to light-flavor (black) and heavy-flavor (red) jets. The solid lines show the distribution for the offline tracks, whereas the points show the FTK tracks. The left-hand plots show the distribution in the barrel and the right-hand plots show the distribution in the end-caps. The upper plots are for the $\mu = 46$ sample and the lower plots are with the $\mu = 69$ sample.

- For an offline *b*-tag (using a sophisticated offline tagger), what efficiency is lost if the trigger requires a *b*-tag?
- The FTK *b*-tag for now is a simple impact parameter significance liklihood tagger.





Hardware update

Il sistema di Memorie Associative

- Il nuovo sistema di memoria associativa (Amchip04, AMBFTK e LAMBFTK) e' stato costruito (vedi sezioni 4.6.1, 4.6.2 e 4.6.3 del TDR) e testato (sezione 4.6.4) con successo.
- Il chip miniasic e' arrivato al CERN. La scheda di test dovrebbe essere pronta (Milano) nel giro di una settimana.
- Il disegno della LAMBminiasic (Pisa) e' pronto ed abbiamo appena sottomesso i gerbers per avere l'offerta del PCB
- Stiamo facendo la AMBSLP. Le schematiche sono pronte (Pisa), il piazzamento anche (Pisa), il CERN sta routando la scheda nell'ambito del progetto europeo IAPP. Dovremmo ordinare il PCB a fine giugno.
- I tests del sistema integrato sono previsti per settembre-ottobre in Grecia
- Tests di cooling sono in corso a Pavia (http://www.pi.infn.it/~paola/consumi.docx e appendice del TDR)
- LAMBSLP e' in stato avanzato di disegno (Pisa) e Pavia costruira' subito dopo il test di produzione della stessa.

FTK_IM

- Il prototipo (Frascati) compatibile con EDRO stato testato a lungo nella Vertical Slice (sezione 7 del TDR, Bologna-Frascati-Pisa-Pavia).

- Il nuovo prototipo compatibile con il Data Formatter (vedi sezione 4.4 del TDR) e' stato recentemente prodotto (Frascati-Waseda) e durante l'estate sara' testato intensamente con il Data Formatter a Fermilab.

- Al CERN il vecchio prototipo sara' testato con il BOC di IBL.

- AUTH (University of Tessaloniki) ha recentemente preso in carico nell'ambito del progetto IAPP la riscrittura dell'algoritmo di clustering nei pixels (vedi TDR), in collaborazione con Frascati e Pisa

Monitoring e diagnostica

Collaborazione AUTH Pisa per la scrittura dei programmi di monitoring e diagnostica.

NEWS

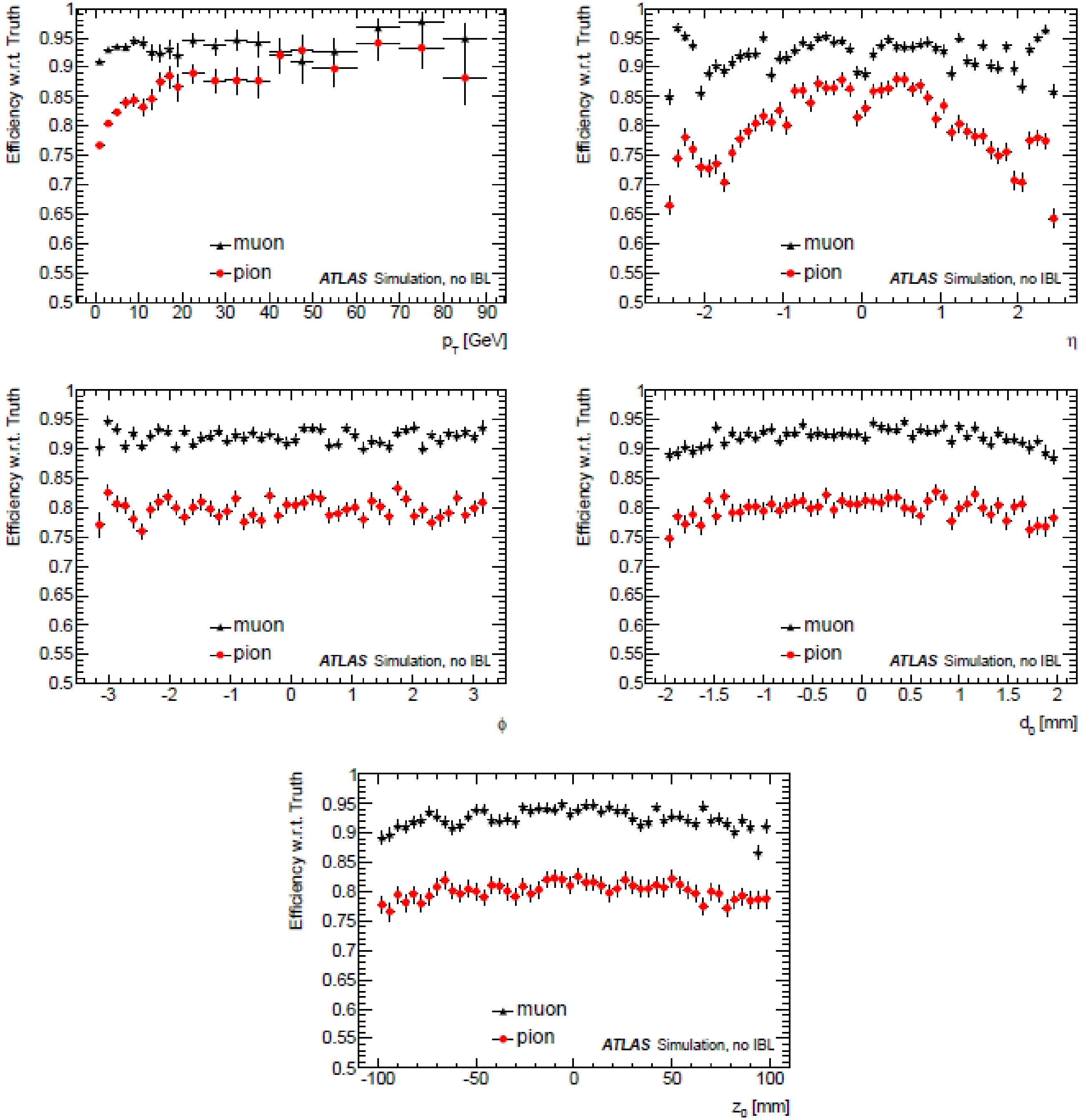
Conferenze… tesi… qualificazioni….scuola di VHDL ….

Periodi al CERN ed in Grecia

Momento di grande attivita’ ed un po’ di confusione

BACKUP

Figure 6: Absolute efficiency with respect to truth particles in muon and pion samples versus p_T, η, ϕ, d_0, and z_0. The truth particles are required to have a $p_T > 1$ GeV.



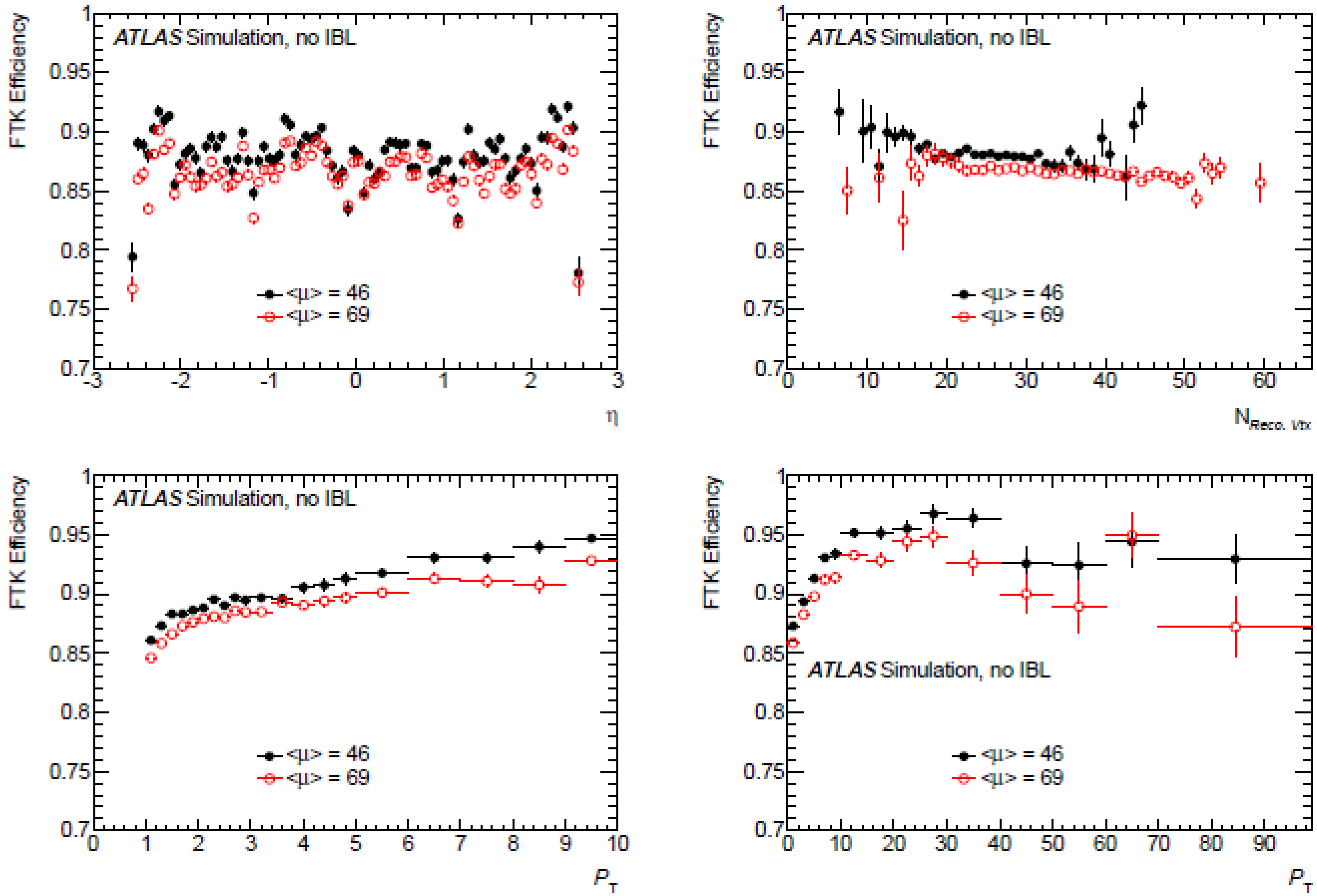


Figure 10: Efficiency of FTK tracks with respect to offline tracks as a function of p_{T}, η, the number of offline reconstructed vertices N_{Recovtx}, and p_{T} in a sample with 46 (black) and 69 (red open circles) pile-up events. p_{T} is shown for $p_{\mathrm{T}} < 10$ GeV in the bottom left and the full range on the bottom right.

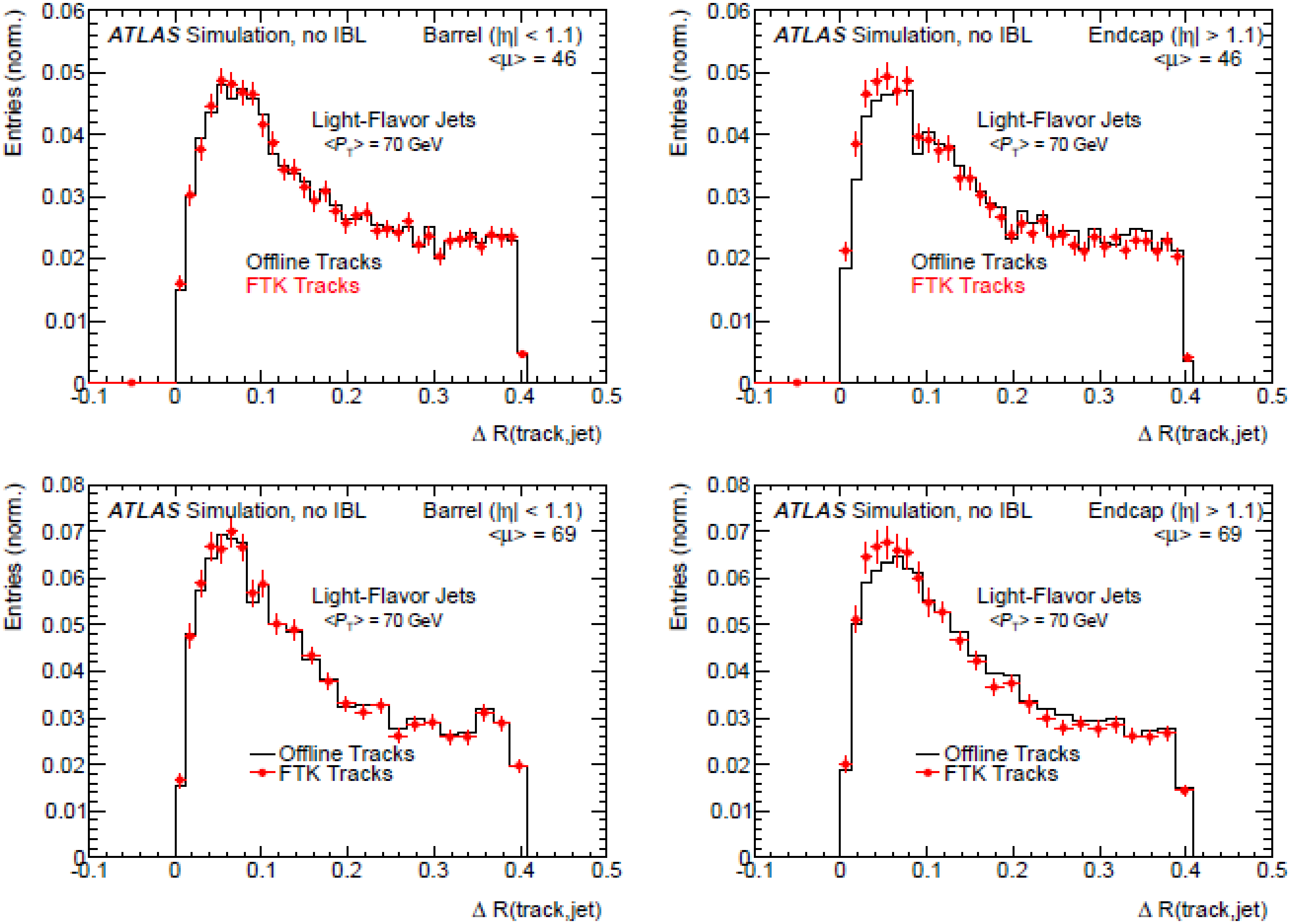


Figure 16: ΔR between tracks and associated to light-flavor jets. The solid lines show the distribution for the offline tracks, whereas the points show the distribution for the FTK tracks. The left-hand plots show the distribution in the barrel and the right-hand plots show the distribution in the end-caps. The upper plots are for the $\mu = 46$ sample and the lower plots are with the $\mu = 69$ sample.

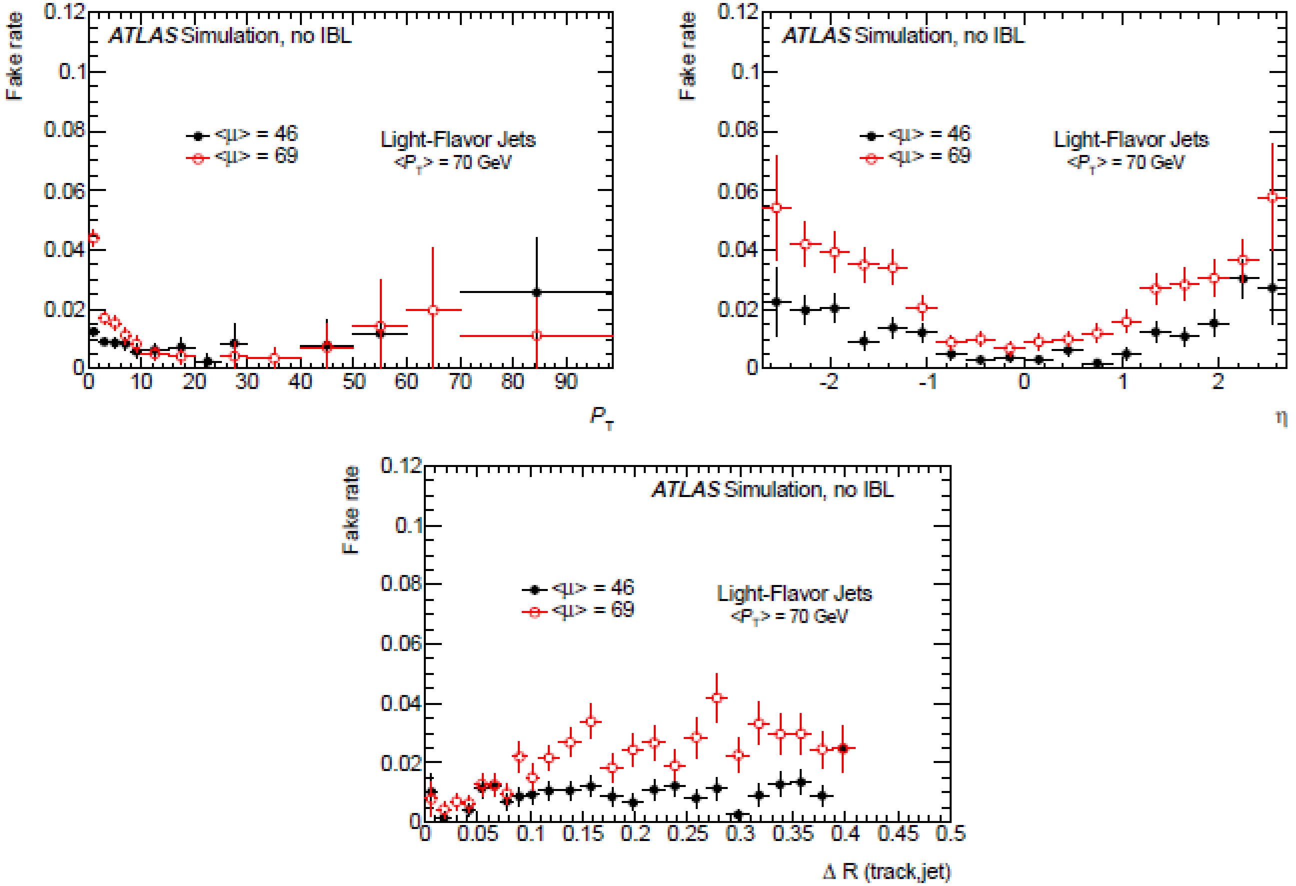
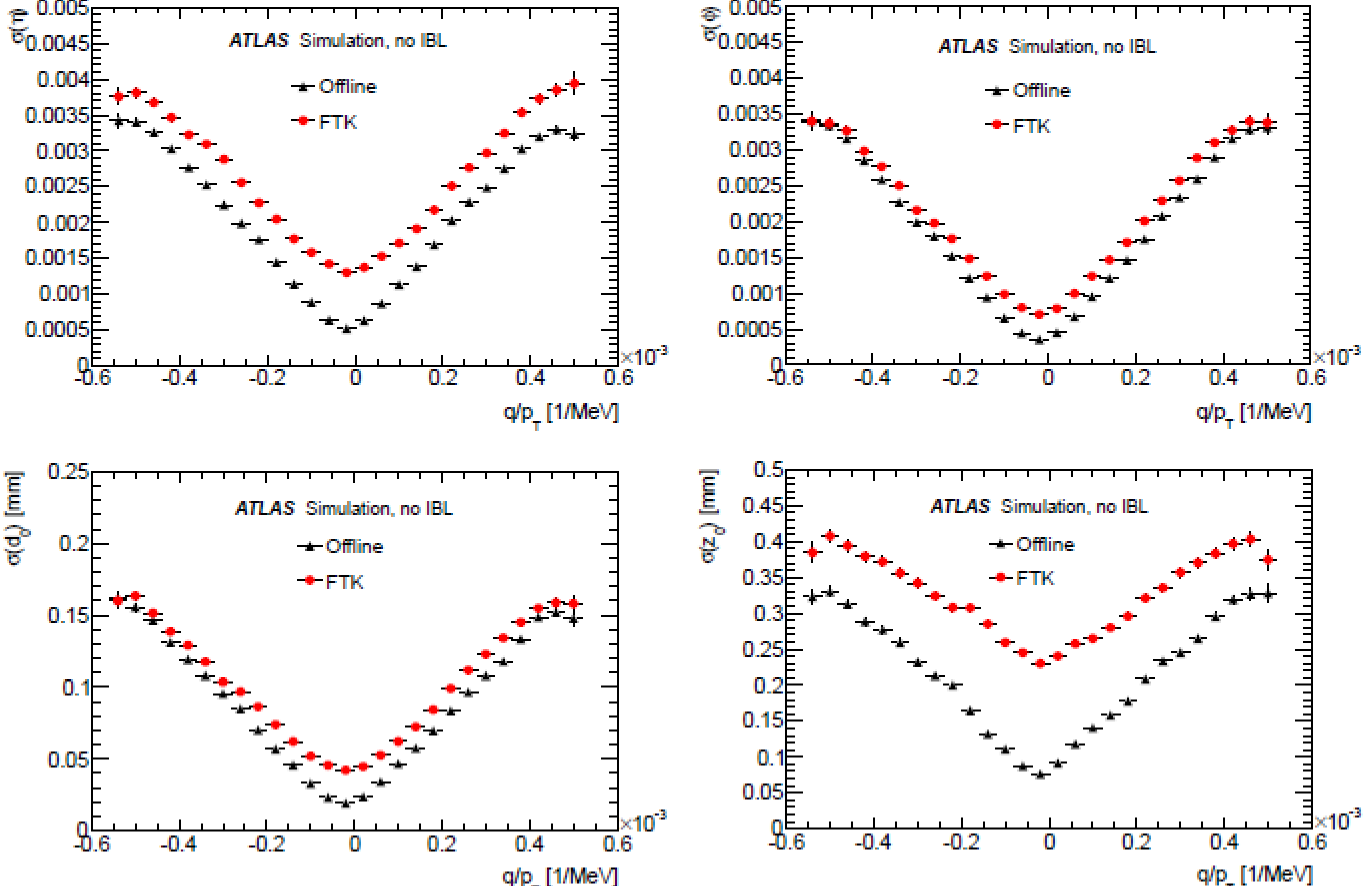


Figure 18: Fake rate of FTK tracks with respect to offline tracks associated to light-flavor jets as a function of p_T, η, and distance from the jet axis in a sample with 46 (black) and 69 (red) pile-up events.



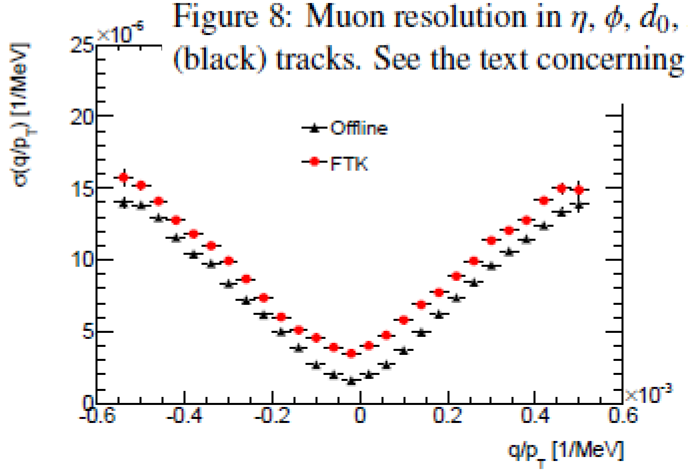


Figure 8: Muon resolution in η, ϕ, d_0, z_0, and $1/p_{\mathrm{T}}$ as a function of curvature, for FTK (red) and offline (black) tracks. See the text concerning the z_0 resolution.

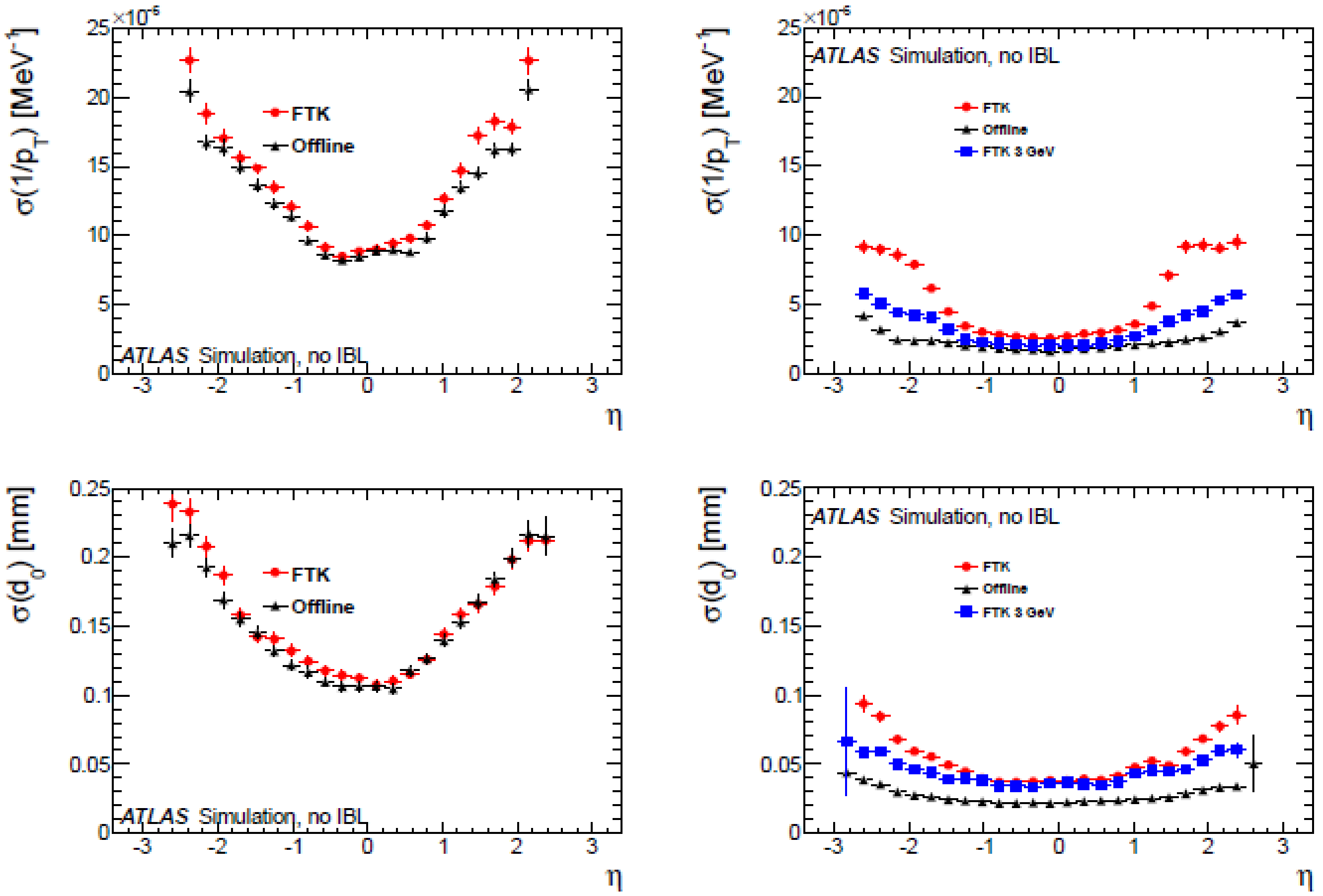


Figure 9: Muon resolution in curvature and d_0 as a function of η, for FTK (red) and offline (black) tracks. The left figures are for muons with $1.0 < p_T < 1.25$ GeV, the right are for $p_T > 5.0$ GeV. The blue points are generated with a special set of FTK fitting constants which are tuned with muons with $p_T > 3$ GeV.