Global comparison of trackers

ITTF Review

Purpose

(a) test existing chain for ITTF output
(b) assess raw performance of the tracker

Can data be read?
Are containers filled properly?
Do other pieces of chain interface properly?

Method

Perform a 0th-level comparison of event & track quantities at common μDST level, including track abundances & distributions, +/- particle and magnetic field effects, etc.

Data sample for comparison

- All analysis done from common μDST's
  - → starting point for most analyses
- Only real events used (no Hijing) in comparison
- Identical filelists chosen (→ equal # events for both trackers)
- File locations

  ProductionMinBias:
  /star/data17/reco/ProductionMinBias/ReversedFullField/P02gh2/2001/308/
  ProductionMinBias:
  /star/data17/reco/ProductionMinBias/FullField/P02gh2/2001/274/
  productionCentral:/star/data07/reco/productionCentral/ReversedFullField/P02gh2/2001/324/
  productionCentral:/star/data07/reco/productionCentral/FullField/P02gh2/2001/321/

Number of events analyzed

	FullField	ReversedFullField
productionCentral	26,457	12,217
ProductionMinBias	34,275	37,788

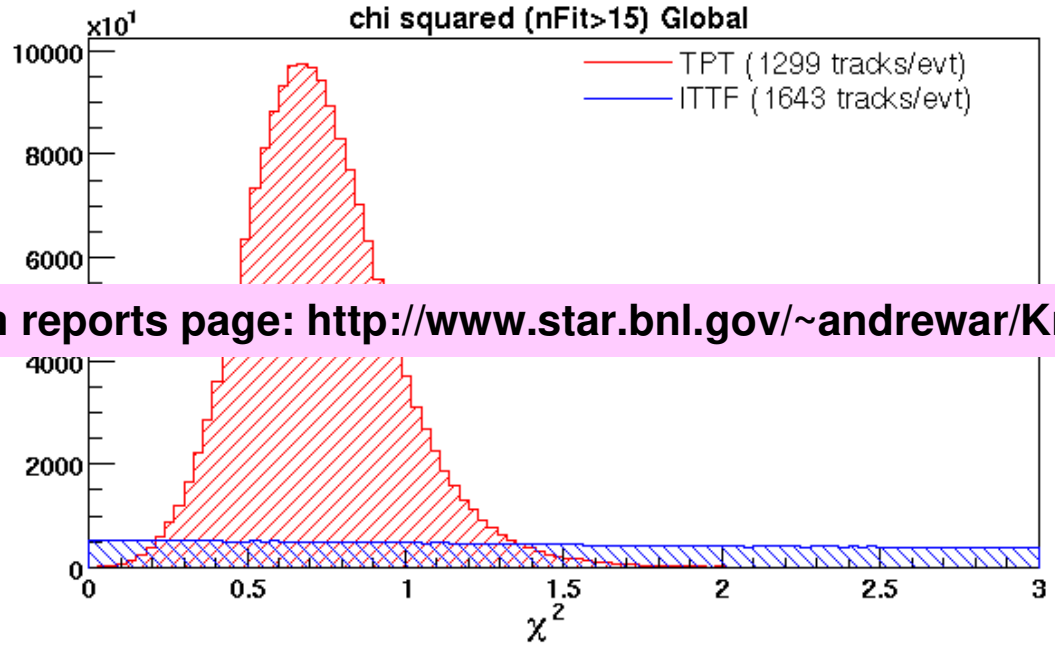
Assumptions/ caveats

- Assume identical active (analyzed) detector subsystems in software

- StEventSummary info cannot be used (not implemented for ITTF)
  primary vertex, #'s of tracks, etc.

- No studies performed which depend on dE/dx (Andrew's talk)
  ∴ no PID-dependent comparisons, etc.

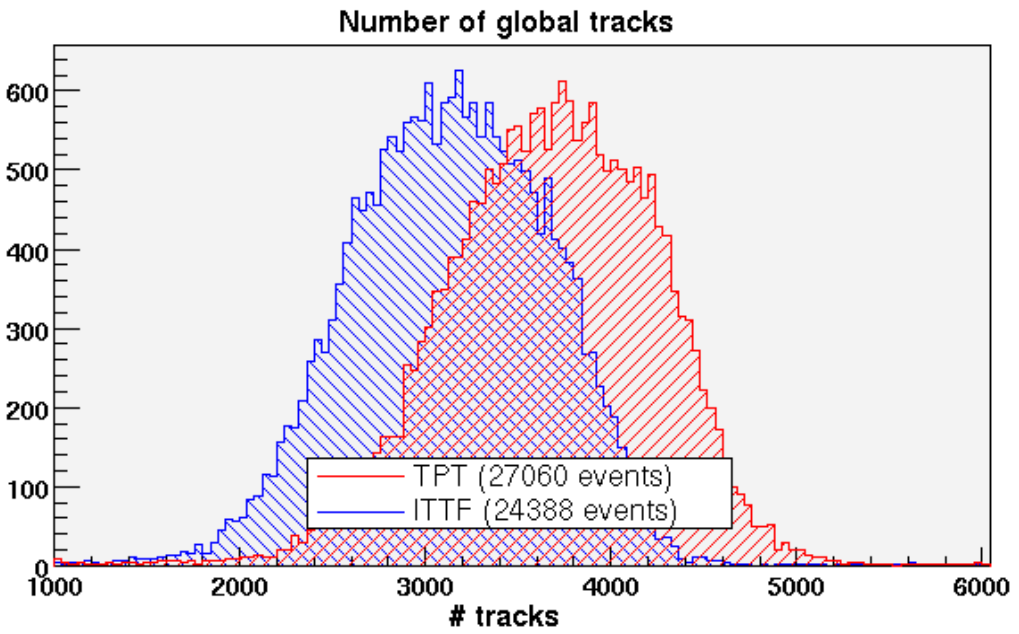
- χ^2 for ITTF tracks not working properly in current test files

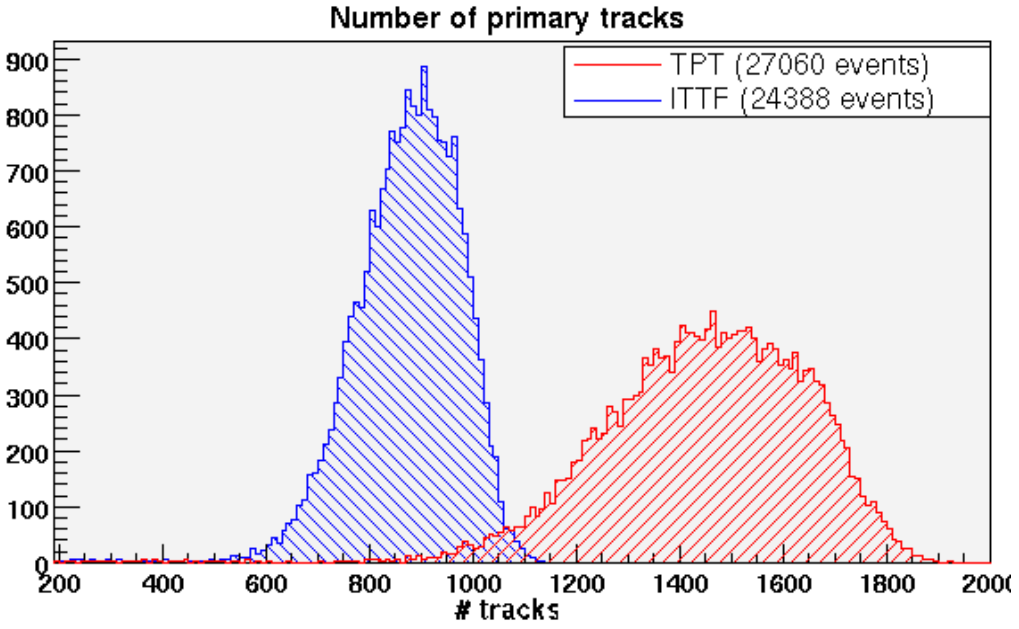


ITTF problem reports page: http://www.star.bnl.gov/~andrewar/KnownProblems.html

Event: track multiplicity

productionCentral

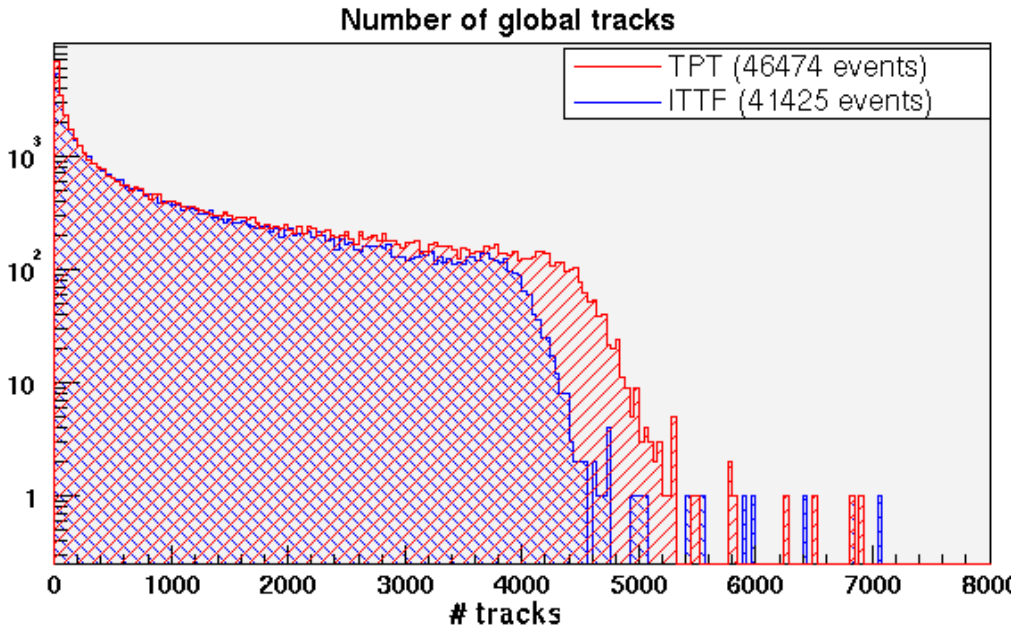


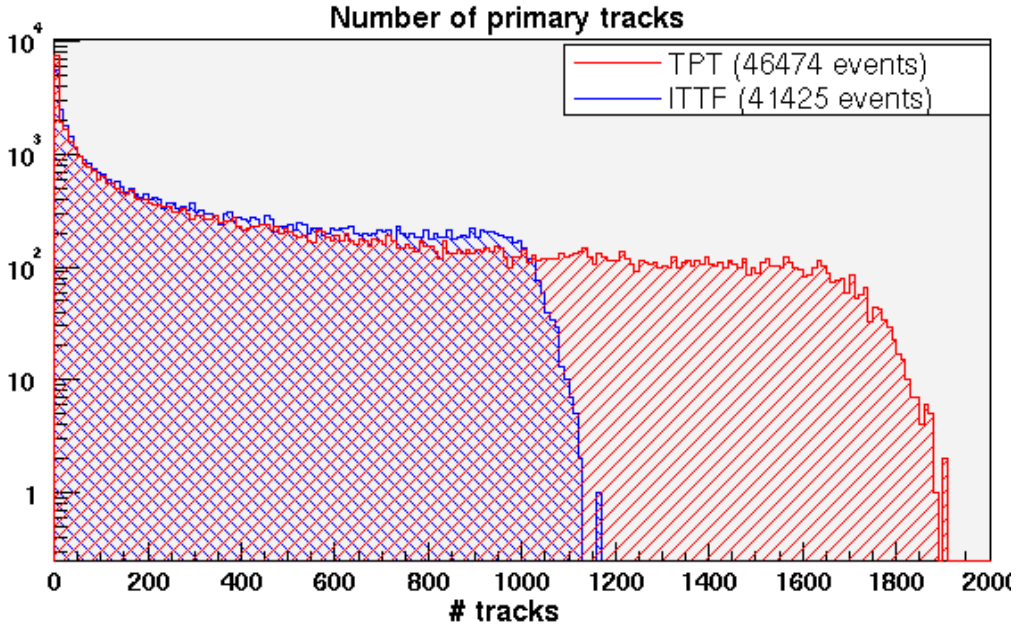


Cuts: nHitsFit>0
nTracks>10

Event: track multiplicity

ProductionMinBias

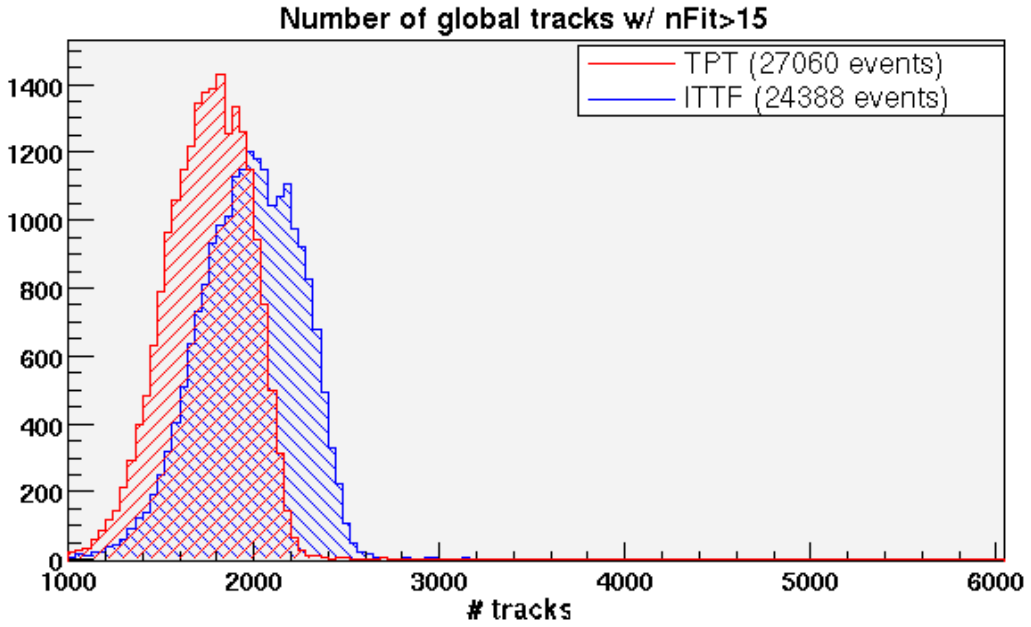


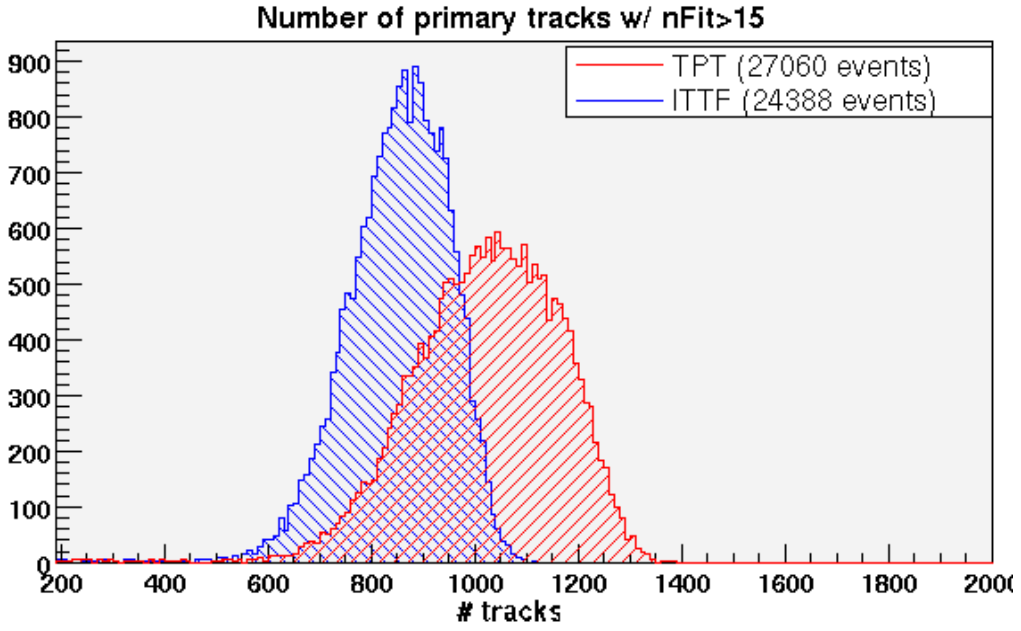


Cuts: nHitsFit>0
nTracks>10

Event: track multiplicity

productionCentral

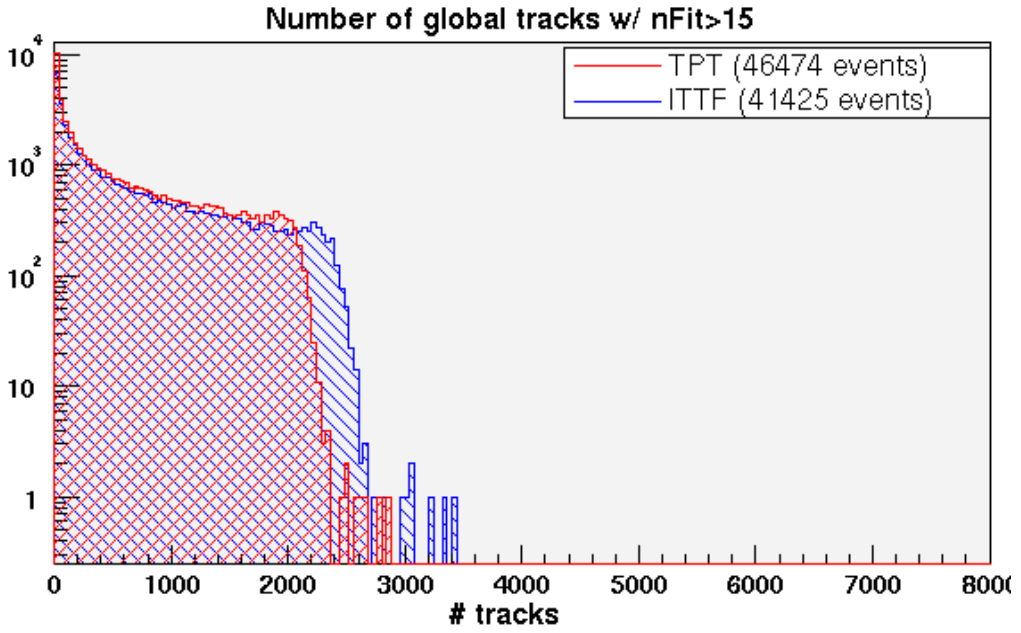


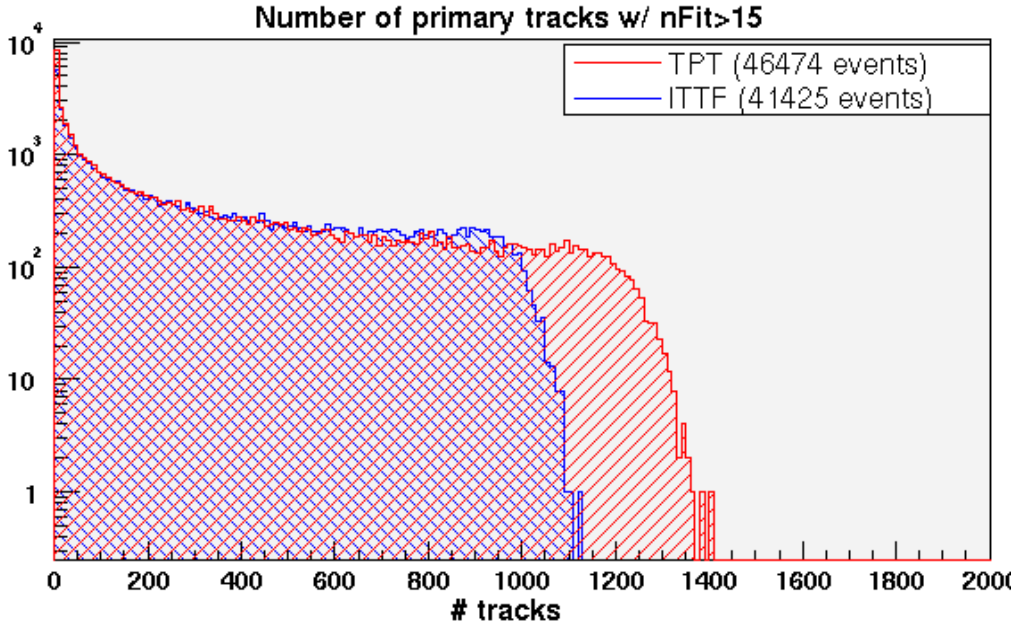


Cuts: nHitsFit>15
nTracks>10

Event: track multiplicity

ProductionMinBias





Cuts: nHitsFit>15
nTracks>10

Event: track multiplicity

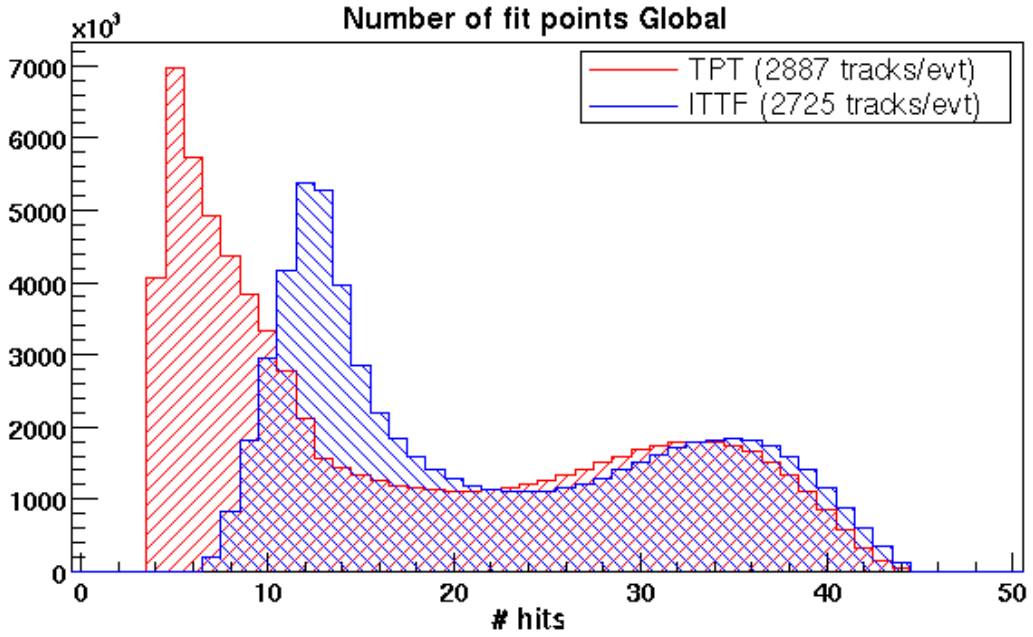
With no nHitsFit cut, ITTF sees fewer globals and fewer primaries

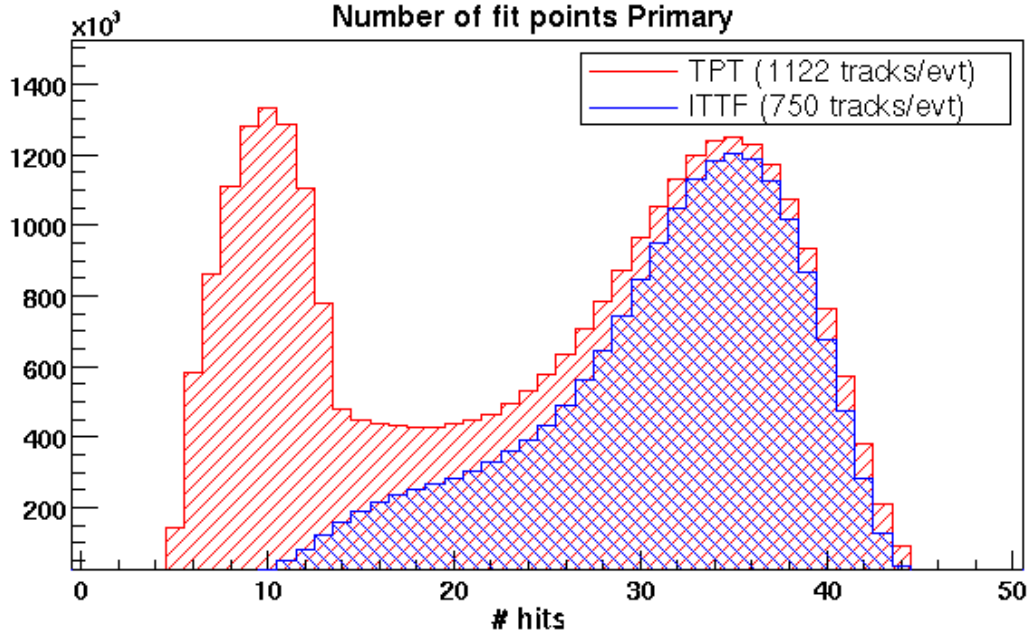
With nHitsFit>15 cut, ITTF sees more globals and fewer primaries

For ProductionMinBias, shapes of distributions are very similar

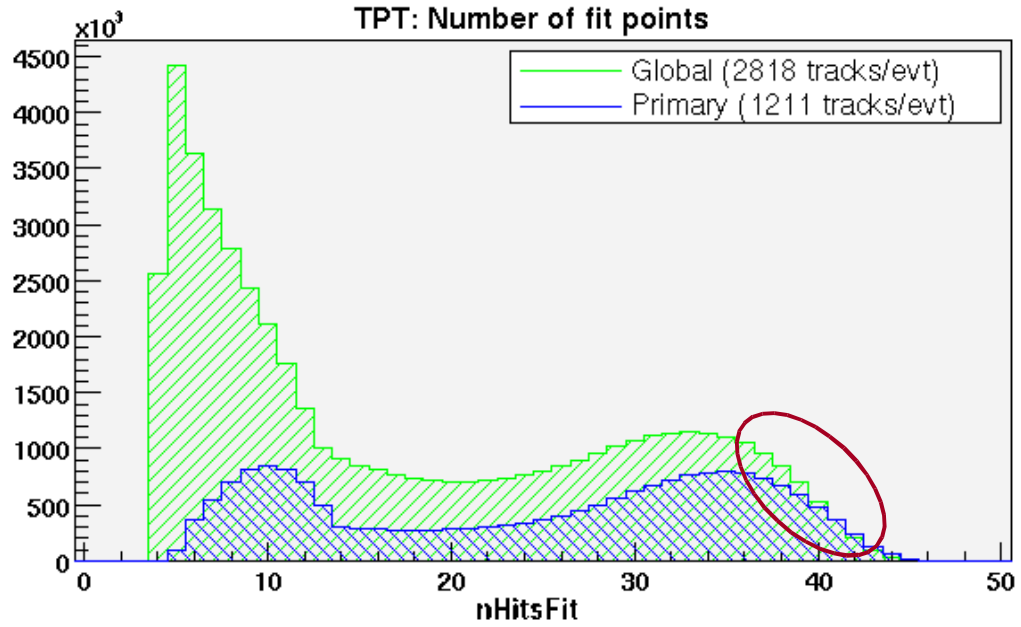
Track: Number of fit points

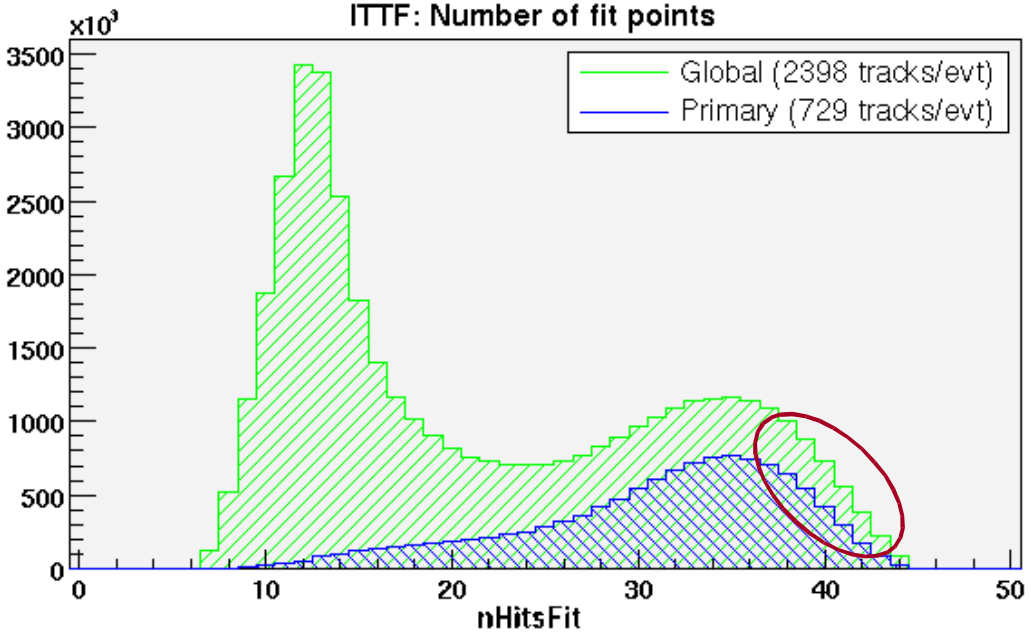
productionCentral





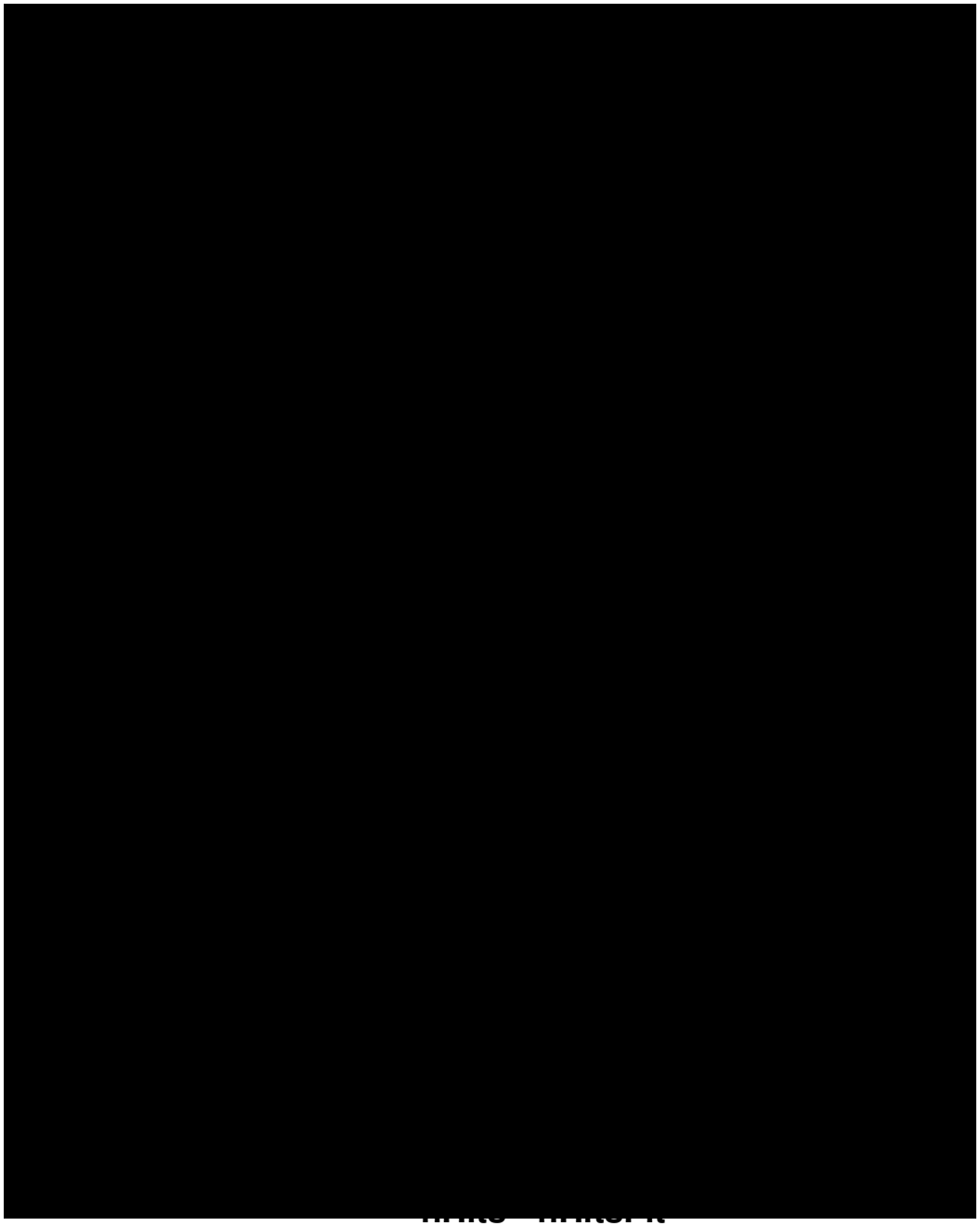
Track: Number of fit points





Bug: nHits vs. nHitsFit

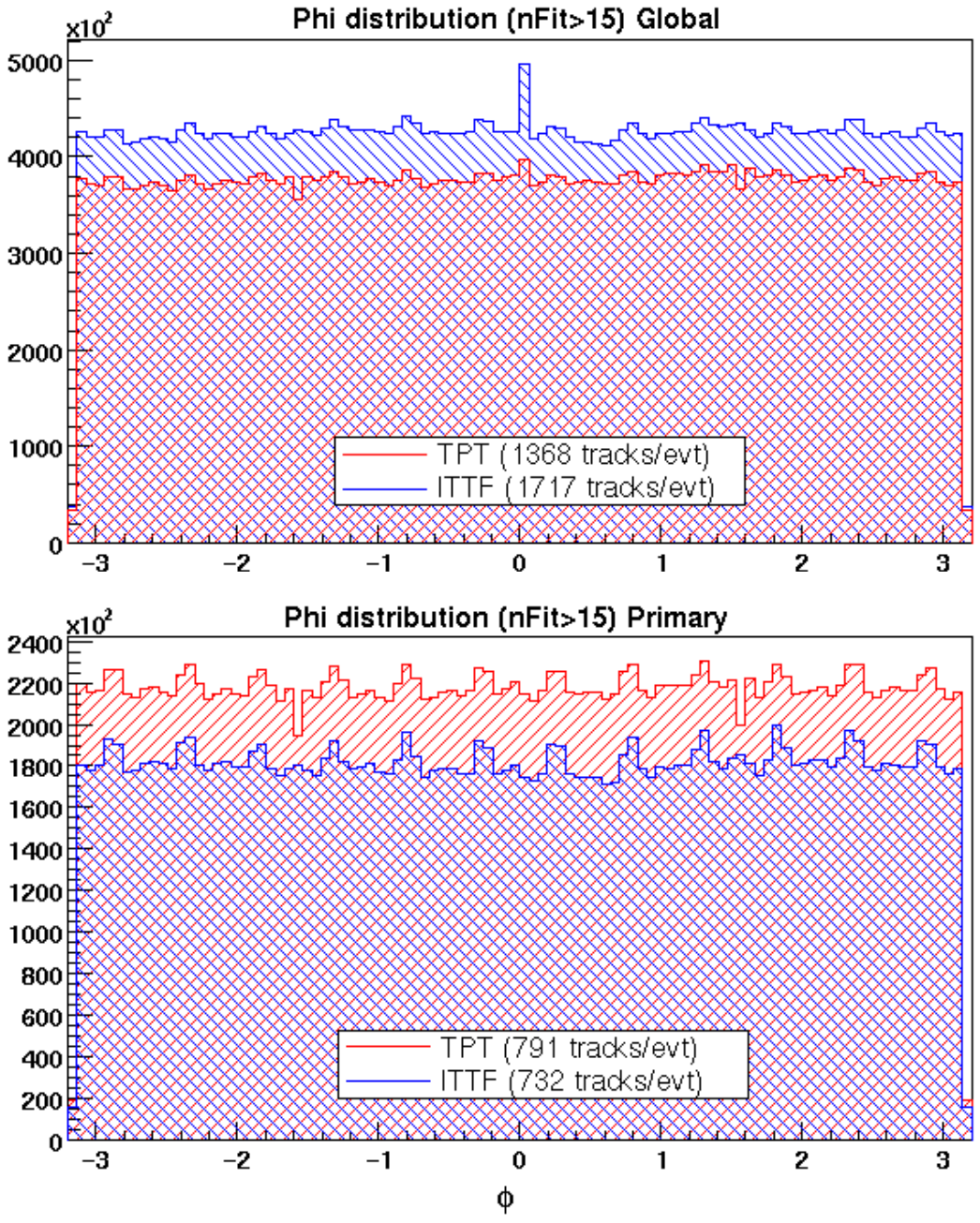
nHitsFit == nHits
???



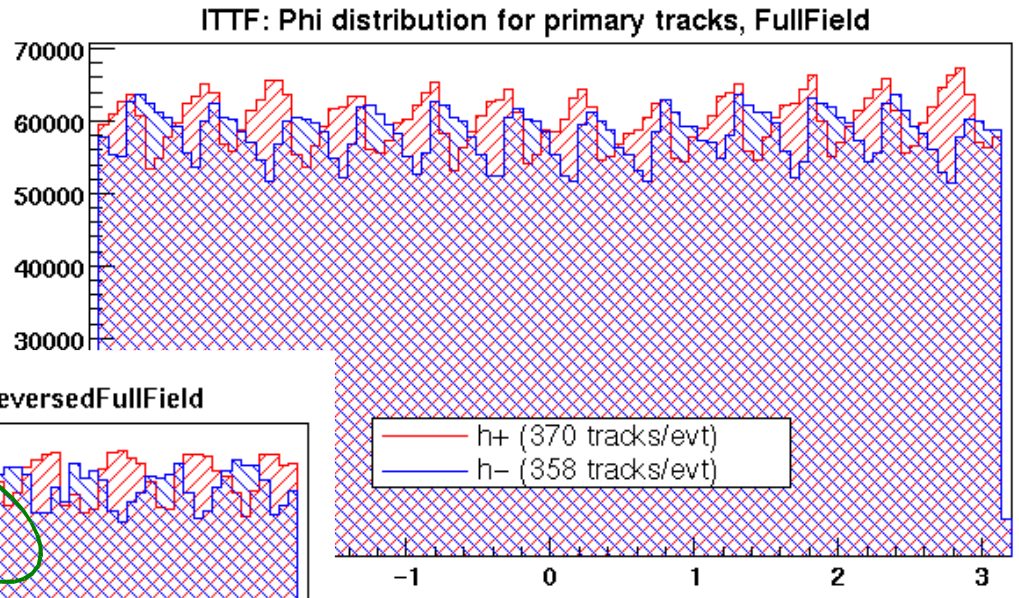
Track: number of hits

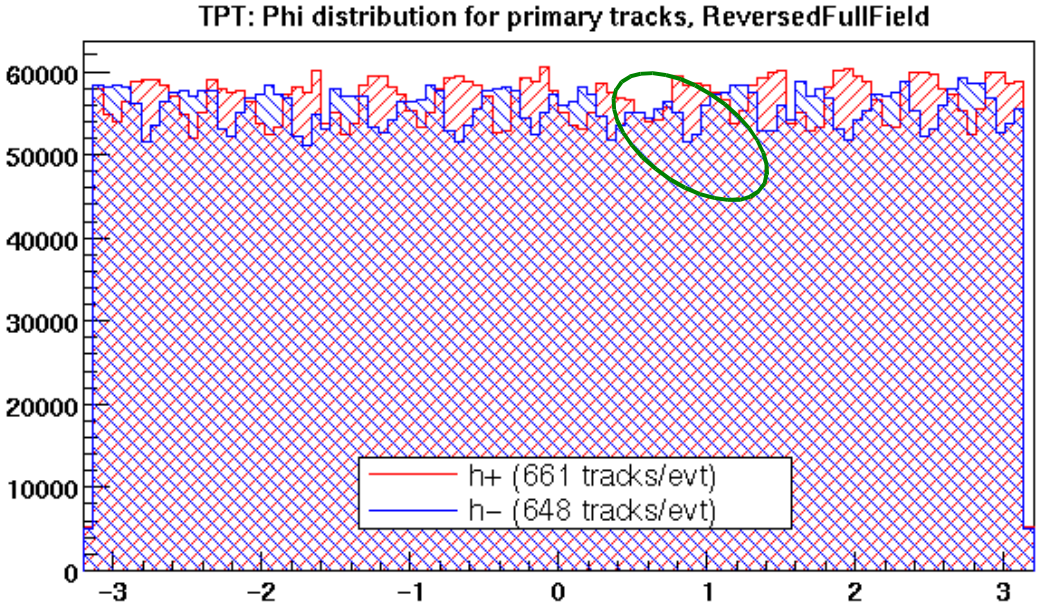
- ITTF uses about the same number of fit points as TPT
- ITTF seems to lose tracks with high number of fit points
  (does the number of fit points change when global → primary?)
- ITTF primaries don't show lower peak at ~12 that TPT shows
- With present bug, nHits distributions can't be compared
  (or are all hits being fit? this might explain the χ^2 problem)

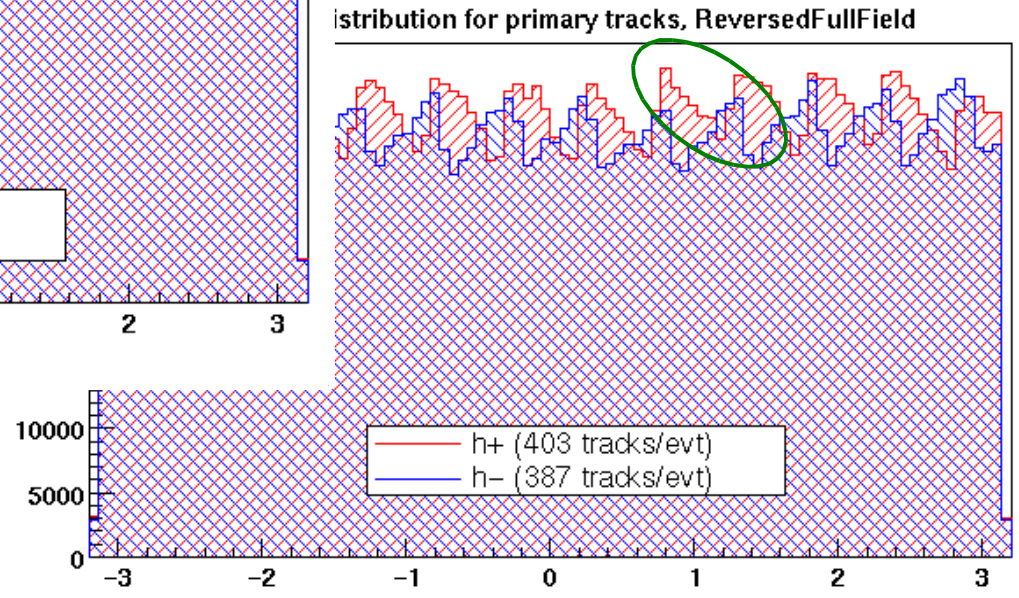
Track: azimuthal distributions



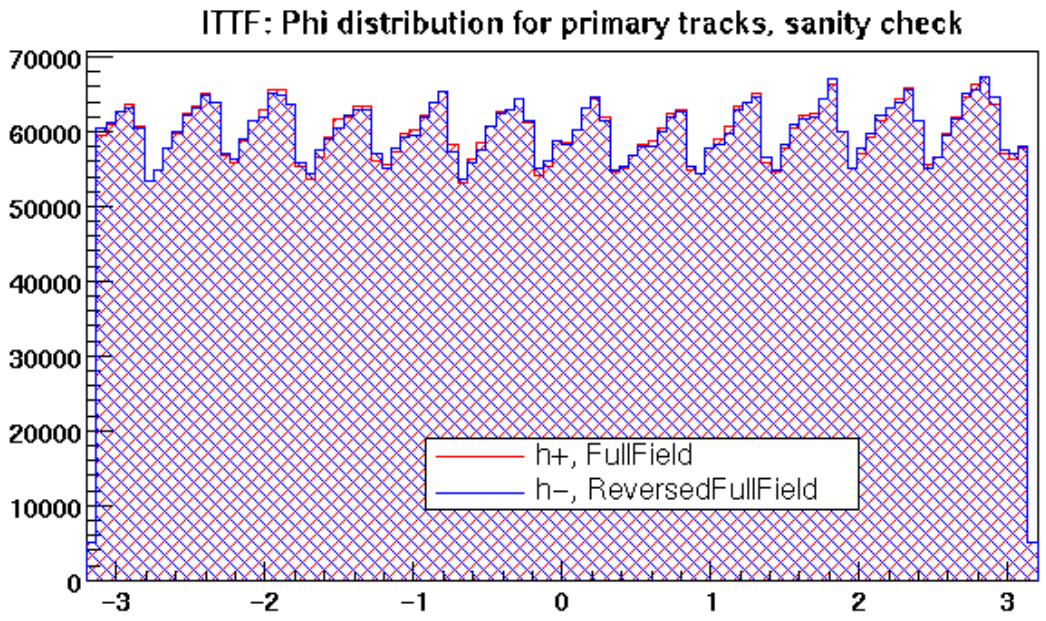
Track: azimuthal distributions

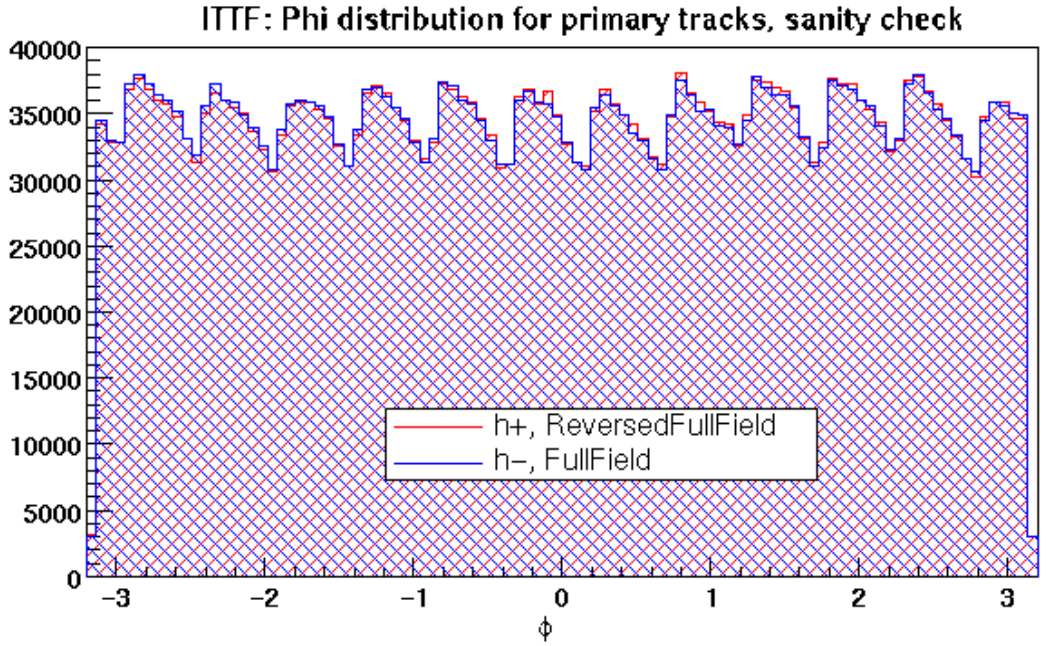




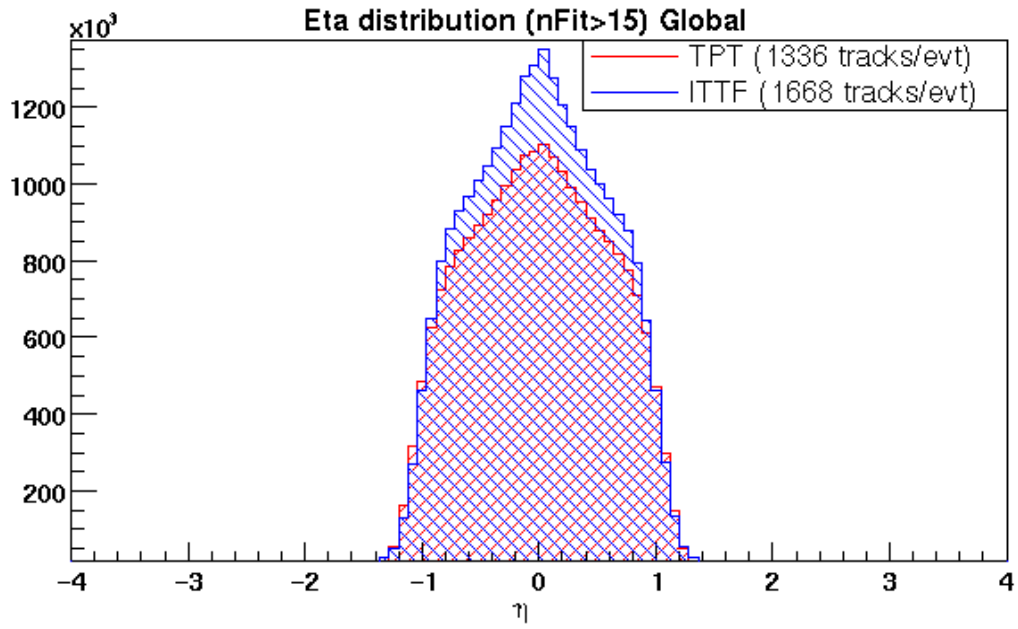


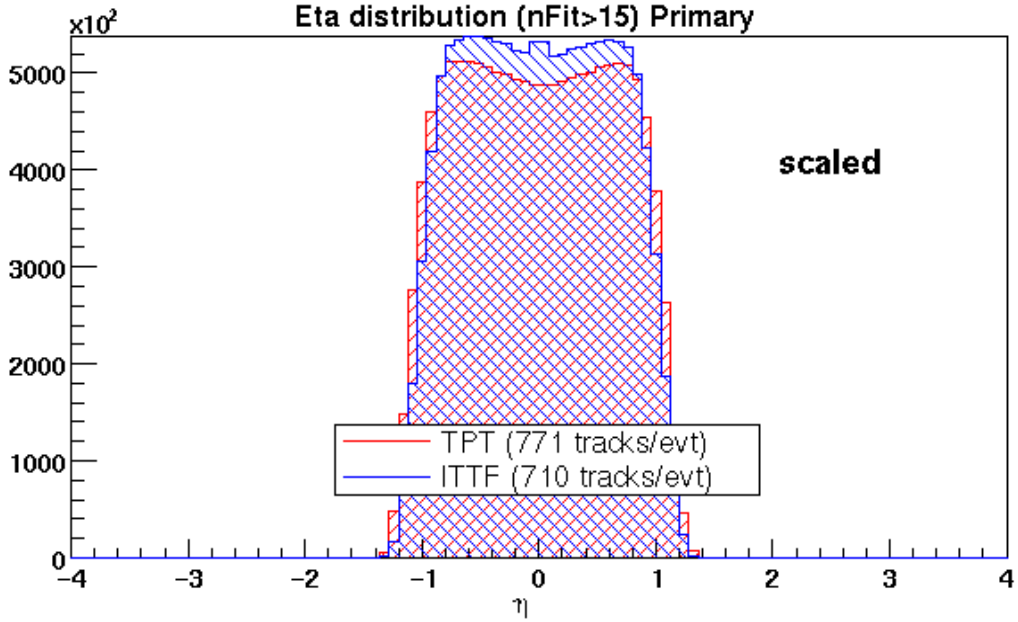
Track: azimuthal distributions, sanity check





Track: pseudorapidity distributions

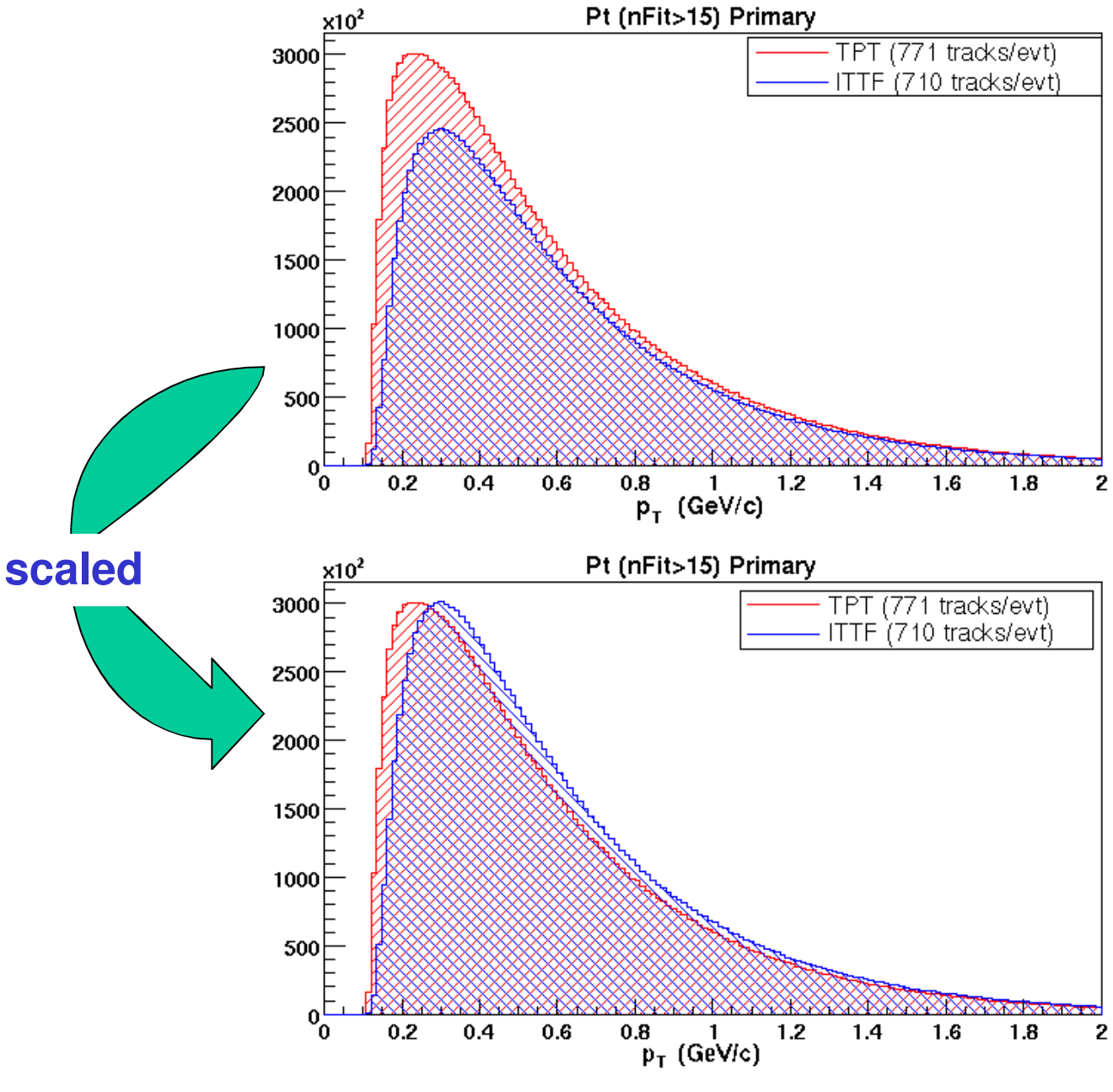




Track: η, ϕ acceptance

- ITTF shows very similar acceptance edges as TPT
- TPT seems to smear out ϕ more than ITTF (qualitative)
- h+/h- $\leftrightarrow$ B+/B- sanity check looks wonderful

Track: momentum



(Current) conclusions

ITTF Review

(a) test existing chain for ITTF output

- ITTF tracks are successfully passed to common μDst's
- Most data members look reasonable
- StEventSummary needs to be filled
- χ^2, dE/dx needs to be fixed/implemented
- For ITTF tracks, nHits == nHitsFit (causes χ^2 problem?)
- PID comparison needs to be done (without handmade corrections)

(b) assess raw performance of the tracker

- With an nHits>15 cut, ITTF finds more globals but less primaries
- ITTF may lose tracks with high nHitsFit
- Sanity check: h+(FF) looks like h-(RFF) and vice versa
- ITTF & TPT show very similar acceptance edges in η, ϕ
- nHitsFit distributions show differences – code or tracker?
- p_T distribution shows difference: ITTF has lower efficiency at low p_T (or shifted to higher p_T)

(Current) conclusions

ITTF Review

- It's a little difficult to assess the global performance of the tracker due to problems & bugs

- The ITTF team has been very responsive as problems arose and were uncovered over the past weeks

  → Andrew Rose & Manuel Calderon