IITF and UPCs

Spencer Klein

UPC Specific Requirements

Processing

ρ^0 analysis

e^+e^- analysis (by Vladimir Morozov)

Conclusions

UPC specific requirements

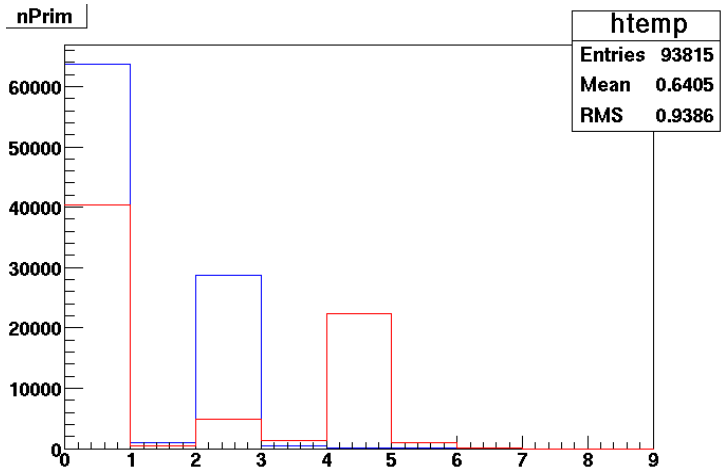
- Small events
  - Mostly 2 tracks
    - Low multiplicity vertexing is critical
    - Vertex position resolution matters
    - 'per event' memory leaks are painful
- Low p_T tracks
  - The e^+e^- analysis goes down to p_T ~ 60 MeV
    - That's where the signal is
    - Half field data
- e/π separation
  - dE/dx

ρ^0 analysis

- 100,000 ρ^0 --> $\pi^+\pi^-$ w/ IITF and old tracker
  - $|Y_\rho| < 1.5$
  - 20 files of 5,000 events each
  - 1 IITF file crashed
    - Why?
    - Use 95,000 'common' events
  - IITF ρ^0 .event.root files are twice as large as old tracker event.root
    - Why?
  - Work from StRoot output
  - No Monte Carlo info on uDsts
    - Can't show resolutions

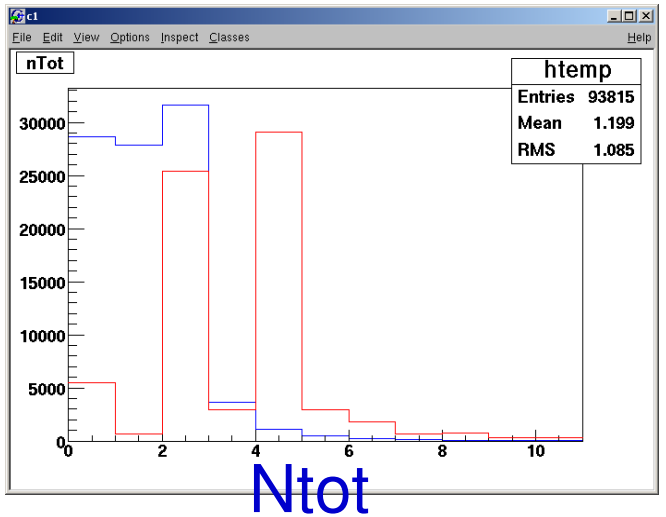
Basic event properties

- Old: 93815 events
- New: 70414 events
  - Where did the rest go?
    - Events with no tracks lost??
- Nprim & Ntot distributions are totally different
  - Massive track splitting in IITF??
  - Technical Problem??
    - IITF +'old' tracks together
- Events with vertex
  - Old: 29620 events
  - New: 28482 events
    - 4% lower



Nprim

Red=IITF Blue – old tracker

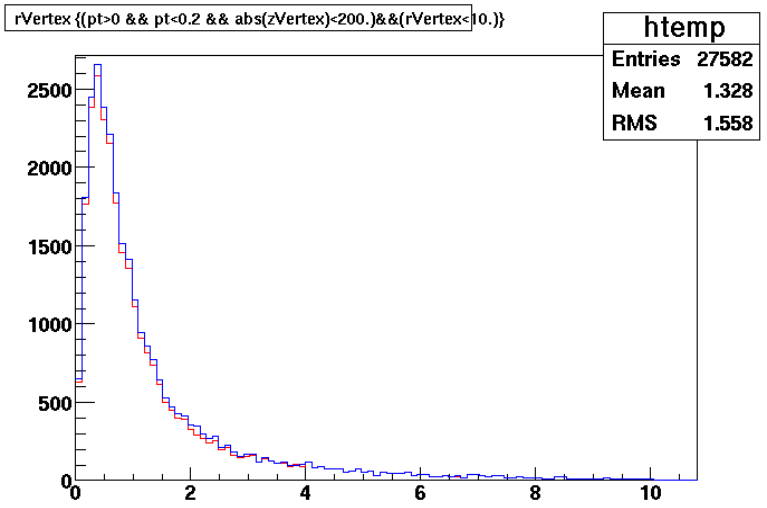


Ntot

Red=IITF Blue – old tracker

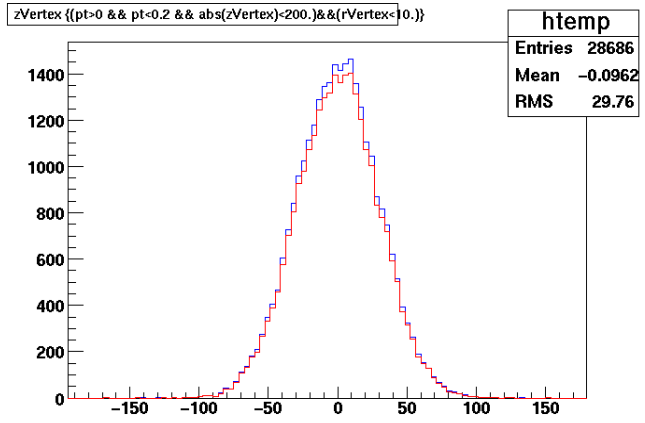
Vertex Properties

- Look very similar



Rvertex

Red=IITF Blue – old tracker

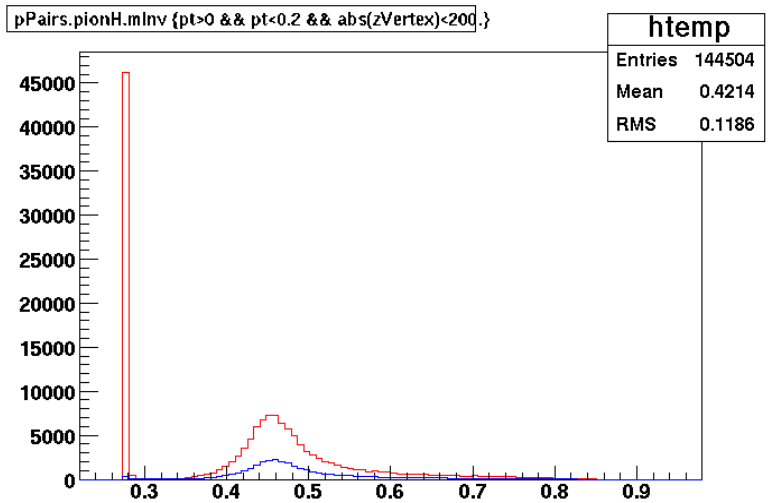


Zvertex

Red=IITF Blue – old tracker

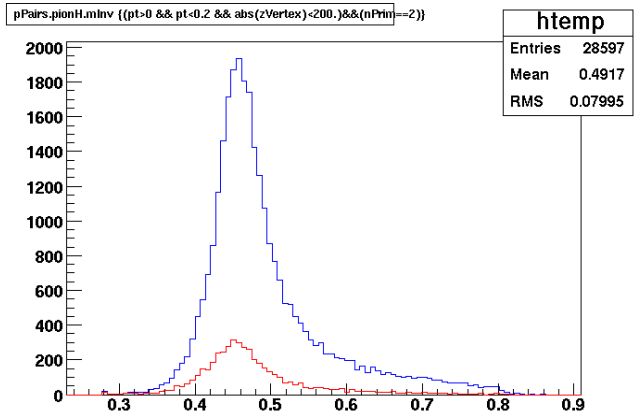
ρ^0 properties

- Take particle pairs
- Track splitting largely kills the analysis
  - Old: 29596 pairs
  - New: 144501 pairs
- nPrim==2 cut
  - Most IITF events lost
  - $M_{\pi\pi}$ spectra look similar
  - $M_{\pi\pi}$ wrong
    - Generated at half field, reconstructed at full?



Pair Mass (all)

Red=IITF Blue – old tracker

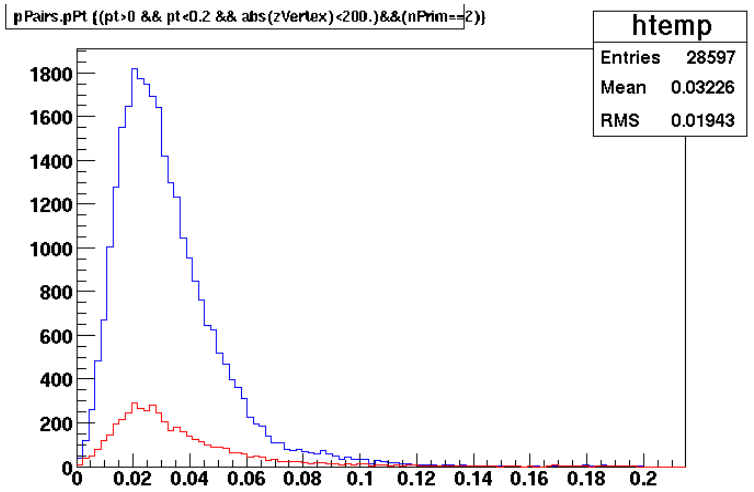


Pair Mass (nPrim==2)

Red=IITF Blue – old tracker

ρ^0 p_T

- Require nPrim==2
- Spectra look similar
  - Is scale correct?
- Old RMS p_T=194 MeV/c
- New RMS p_T=258 MeV/c
- Substantially different

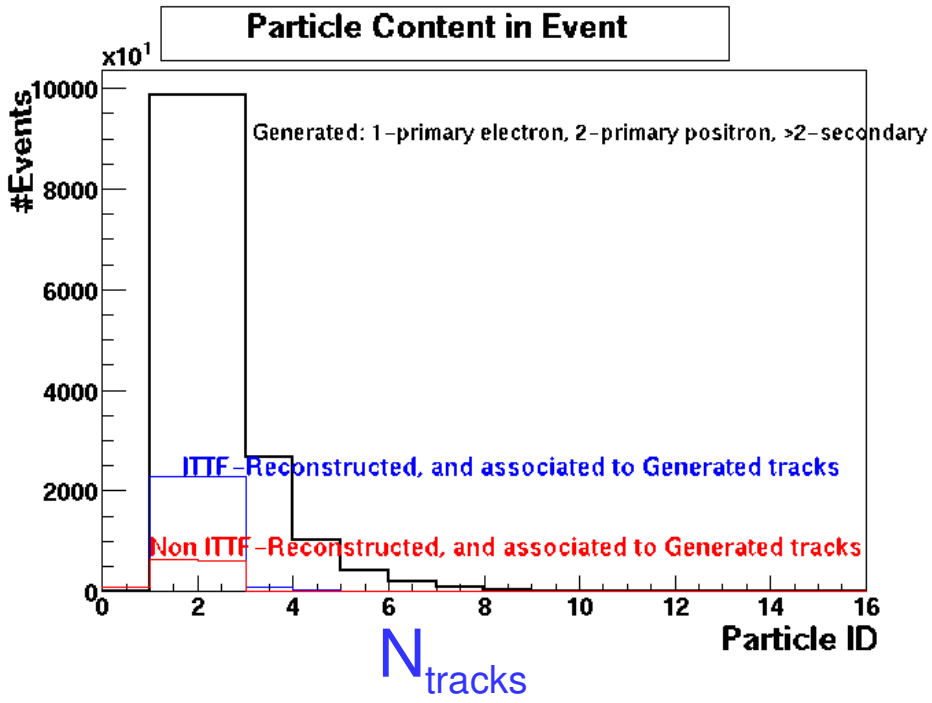


Pair p_T (nPrim==2)

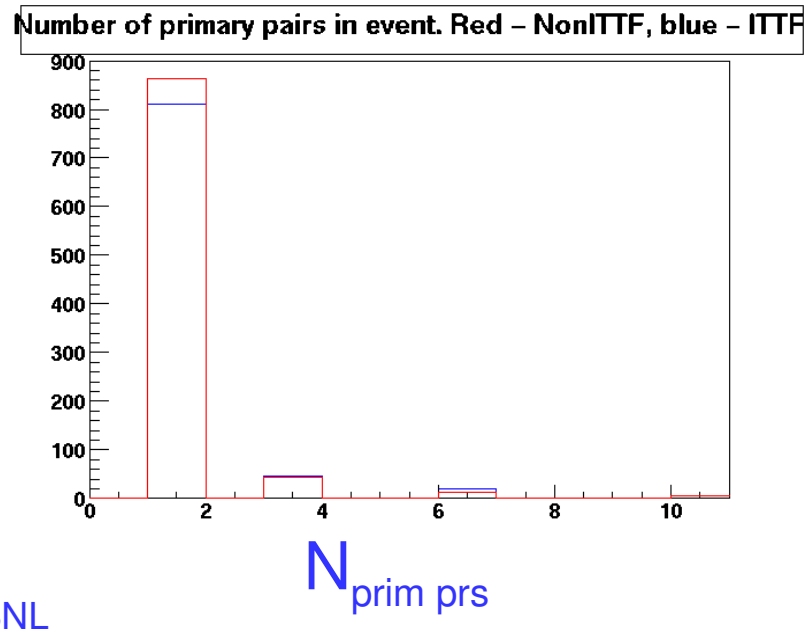
Red=IITF Blue – old tracker

e^+e^-

- Analysis by Vladimir Morozov
- Should be generated and reconstructed with half field
- 100,000 events
- IITF finds many more tracks than non-IITF
- The number of primary pairs is comparable??
- IITF creates an awful lot of 1-track events
  - Because of the kinematics, we expect a lot, but why are so many more in IITF



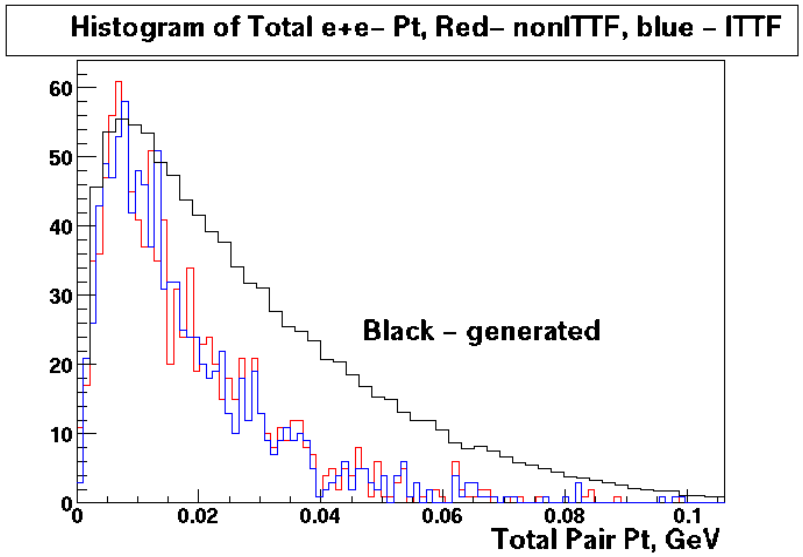
N_{tracks}

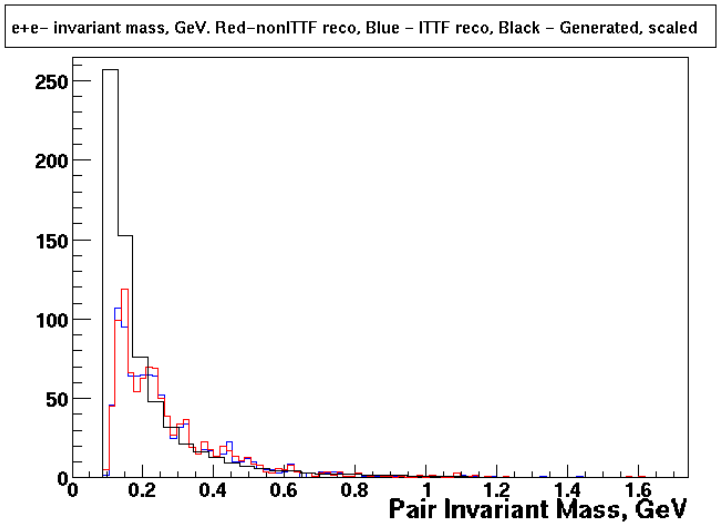


$N_{prim\ prs}$

e^+e^- p_T and M_{inv}

- Look fairly similar
- Limited statistics
  - Not enough for detailed comparison





Conclusions

- The IITF ρ^0 sample showed massive track splitting
  - Algorithmic flaw or technical problem?
    - There is no documentation for the files that were produced
  - The problems made it impossible to make sensitive comparisons
    - RMS P_T for the 2 ρ^0 samples was substantially different
- The IITF e^+e^- sample had a huge number of 1-track events
  - Would a similar analysis on real data behave similarly?
- These tests give us no confidence that IITF is ready for use.
- We request a well-documented production of our files and adequate time to test the output files.
  - Ideally, this test will include studies with data as well as simulations.