Tracking Results on the FastSim MinBias MC with Pythia CW900A Tune

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for tracking POG

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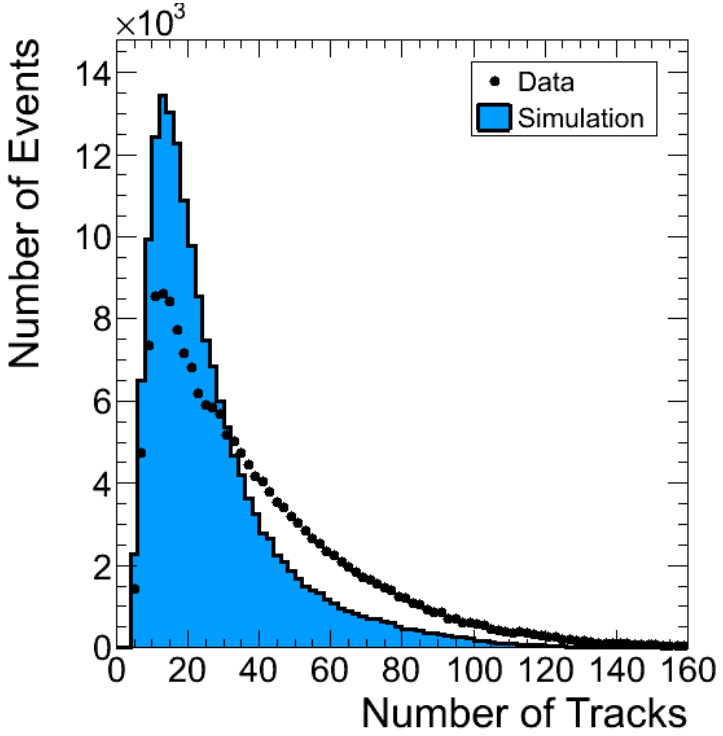
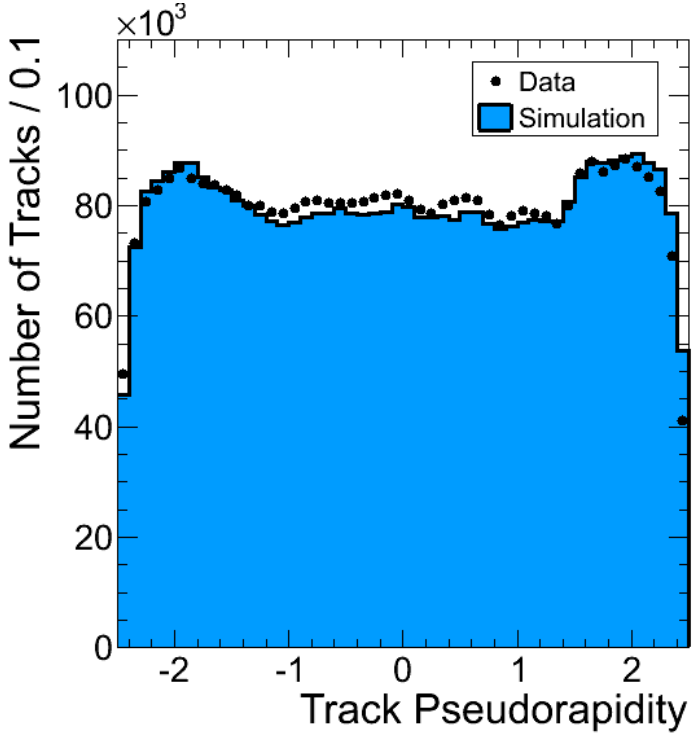
Outline

- Brief reminder of the data/MC discrepancy in the number of Tracks distributions
- Compare the tracking distributions between the Pythia MC with new Tune CW900A and the default Tune D6T
- Compare the data and the MC with new Pythia Tune CW900A
- Conclusions

Brief Reminder of the data/MC Discrepancy in Track Distributions





- The data has 40% more tracks than MC, the excess is mainly in low pT (< 40%) region
- With pT > 1 GeV, the excess is still about 25% on average
- The data/MC discrepancy in nTracks is correlated with data/MC disagreement in SumEt

http://indico.cern.ch/materialDisplay.py?contribId=9&materialId=slides&confId=91162

What about the MinBias MC at 7TeV with new tune CW900A?

Data Sample and Event Selections

- Data Sample:
  /MinimumBias/Commissioning10-Apr1Skim_GOODCOLL-v1/

- MC Samples

  /MinBias/Spring10-START3X_V26A_356ReReco-v1
  /MinBias_TuneCW900A_7TeV-pythia6/Spring10-START3X_V26_7TeV_FastSim-v1
  /MinBias_TuneD6T_7TeV-pythia6/Spring10-START3X_V26_7TeV_FastSim-v1/

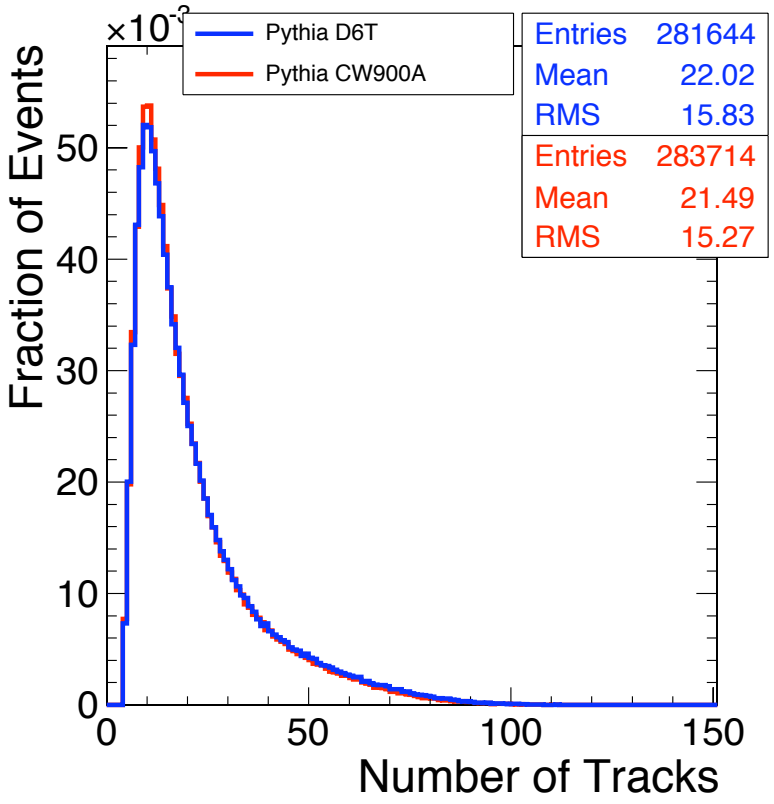
- Event Selection

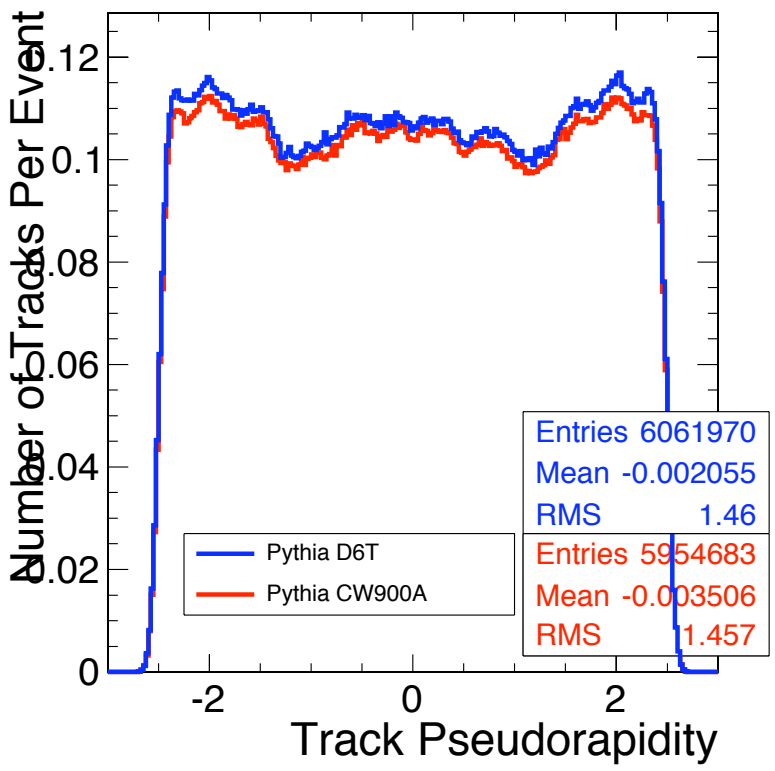
  Both data and MC have the GOODCOLL selections. FullSim MC doesn't require trigger bit 0 and physDecl. FastSim uses emulator for the BSC triggers

- Track Selection (select primary tracks and reject fakes)

  HighPurity && $\sigma pT/pT < 5\%$ && $|dz(pvtx)|/(\sigma dZ) < 10$

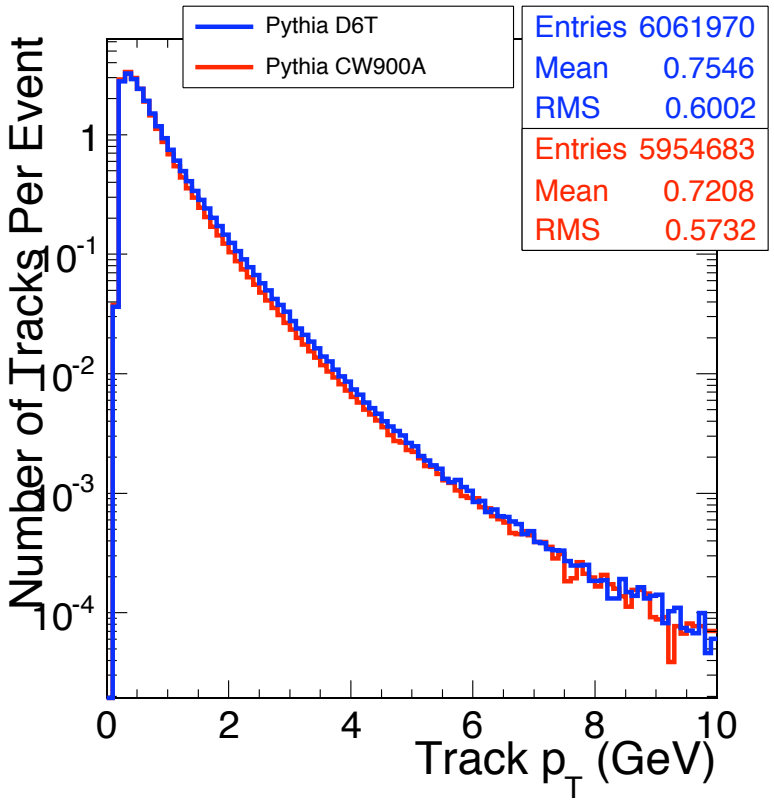
Compare D6T/CW900A FastSim MC-Normalized by nEvents (1/2)

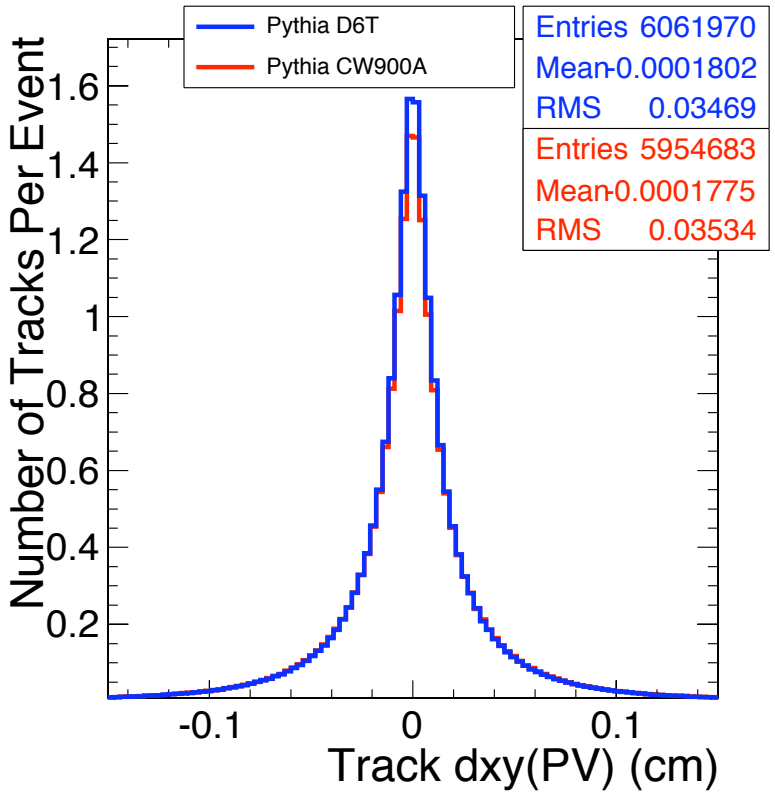




- The MC with Pythia Tune CW900A has even less number of tracks per event than D6T
- The eta distributions are comparable between the CW900A and D6T tune

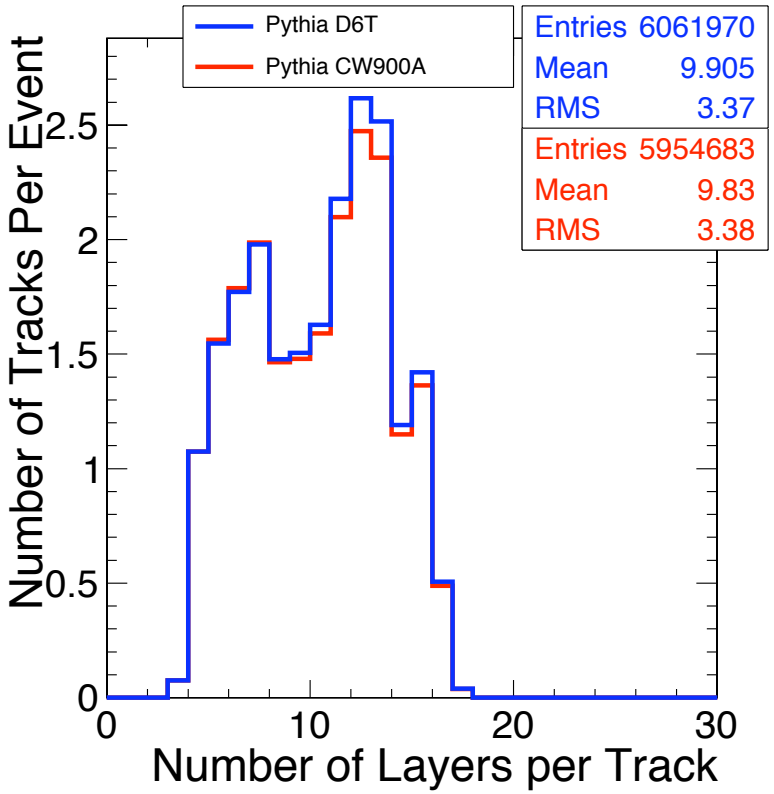
Compare D6T/CW900A FastSim MC-Normalized by nEvents (2/3)

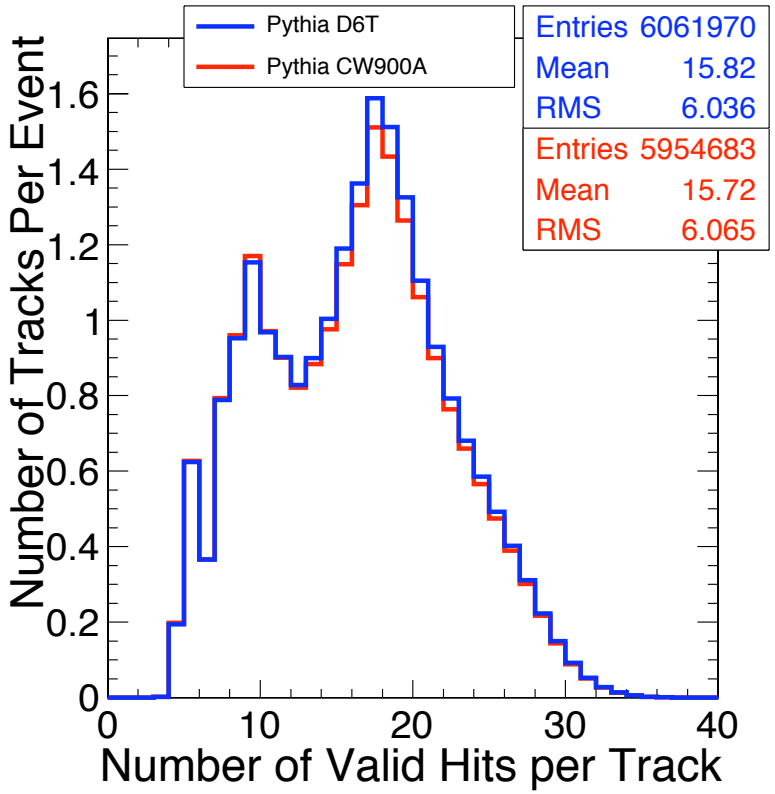




- The pt and dxy distributions are comparable between the CW900A and D6T tune

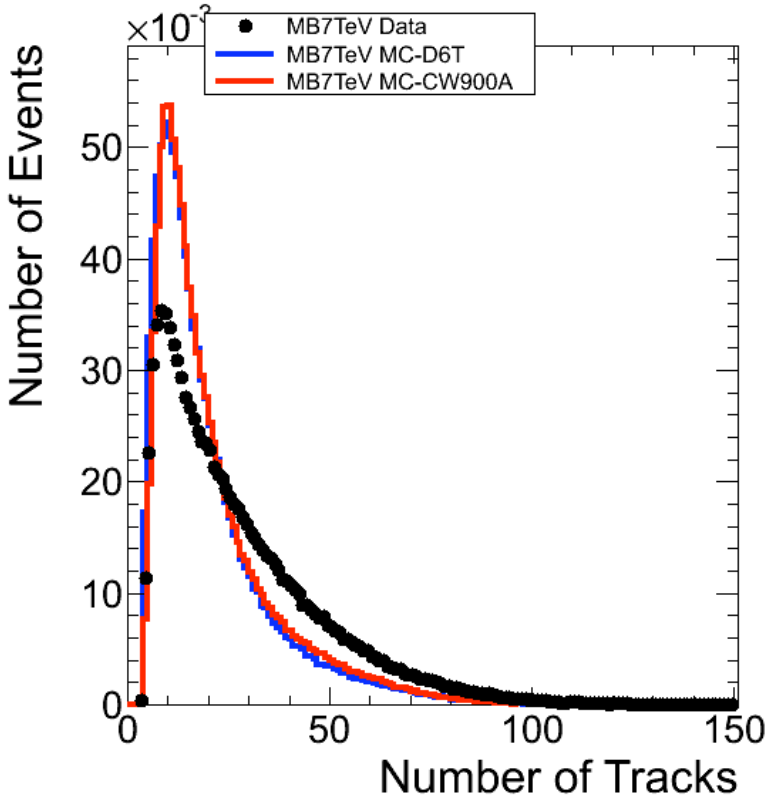
Compare D6T/CW900A FastSim MC-Normalized by nEvents (3/3)

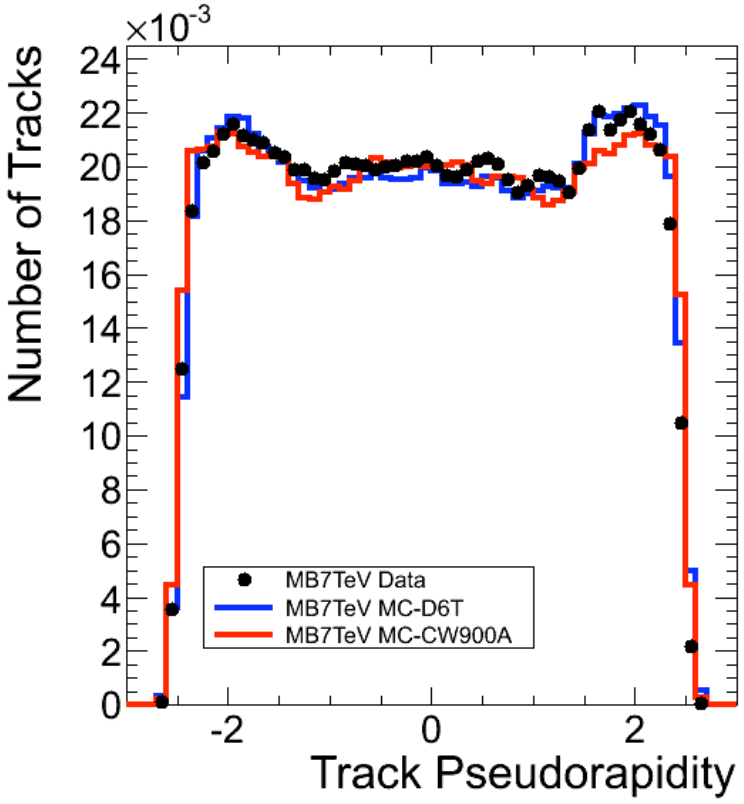




•The number of valid tracker hits and layers distributions are comparable between the CW900A and D6T tune

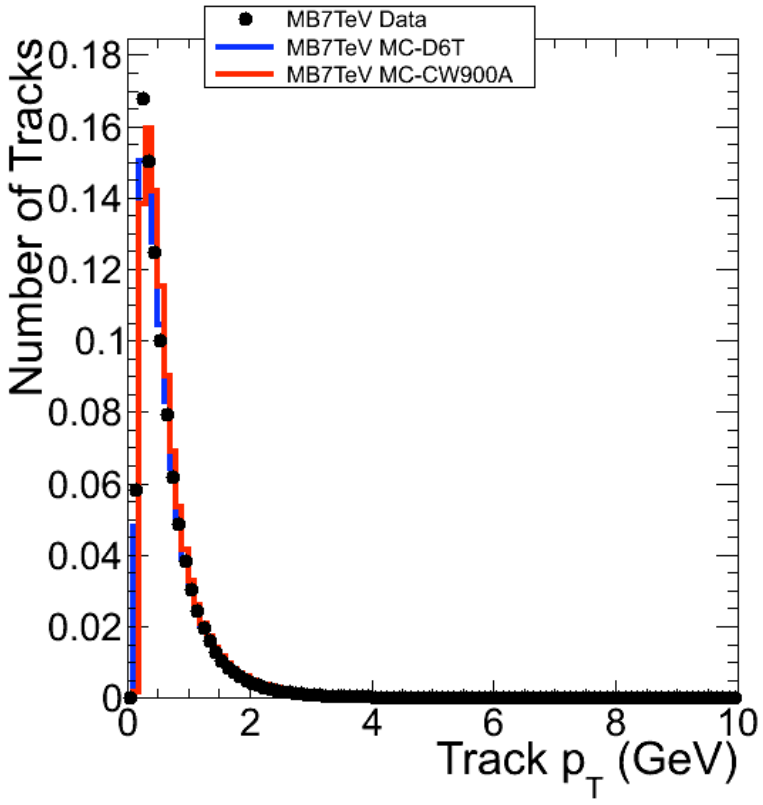
Compare the data and the MC with Pythia Tune D6T/CW900A (1/2)

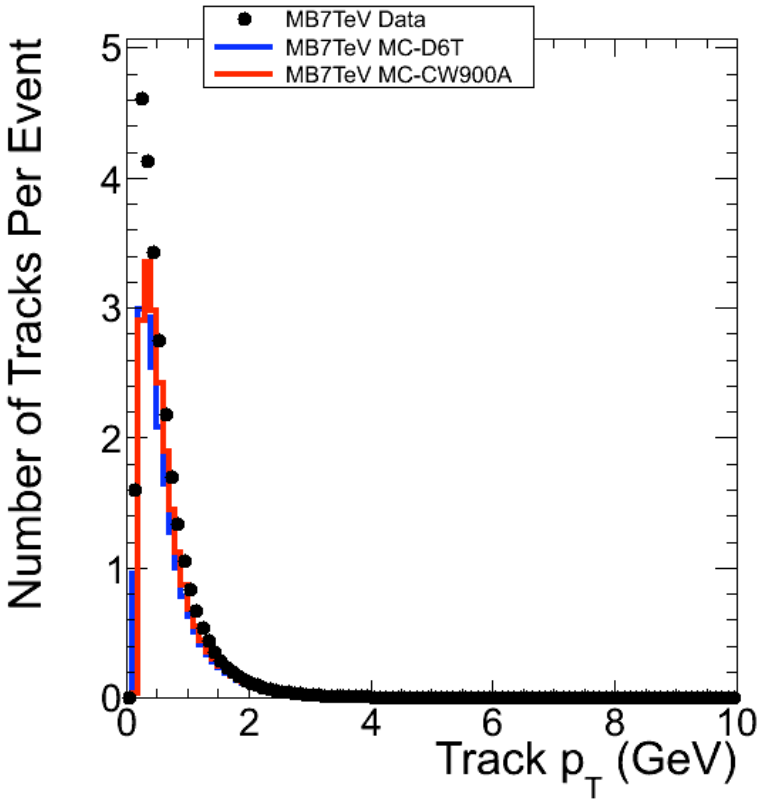




- Pythia Tune CW900A and D6T have comparable nTracks, similar deficit compared to data
- Track eta distributions normalized by nTracks are comparable between the two MC tunes

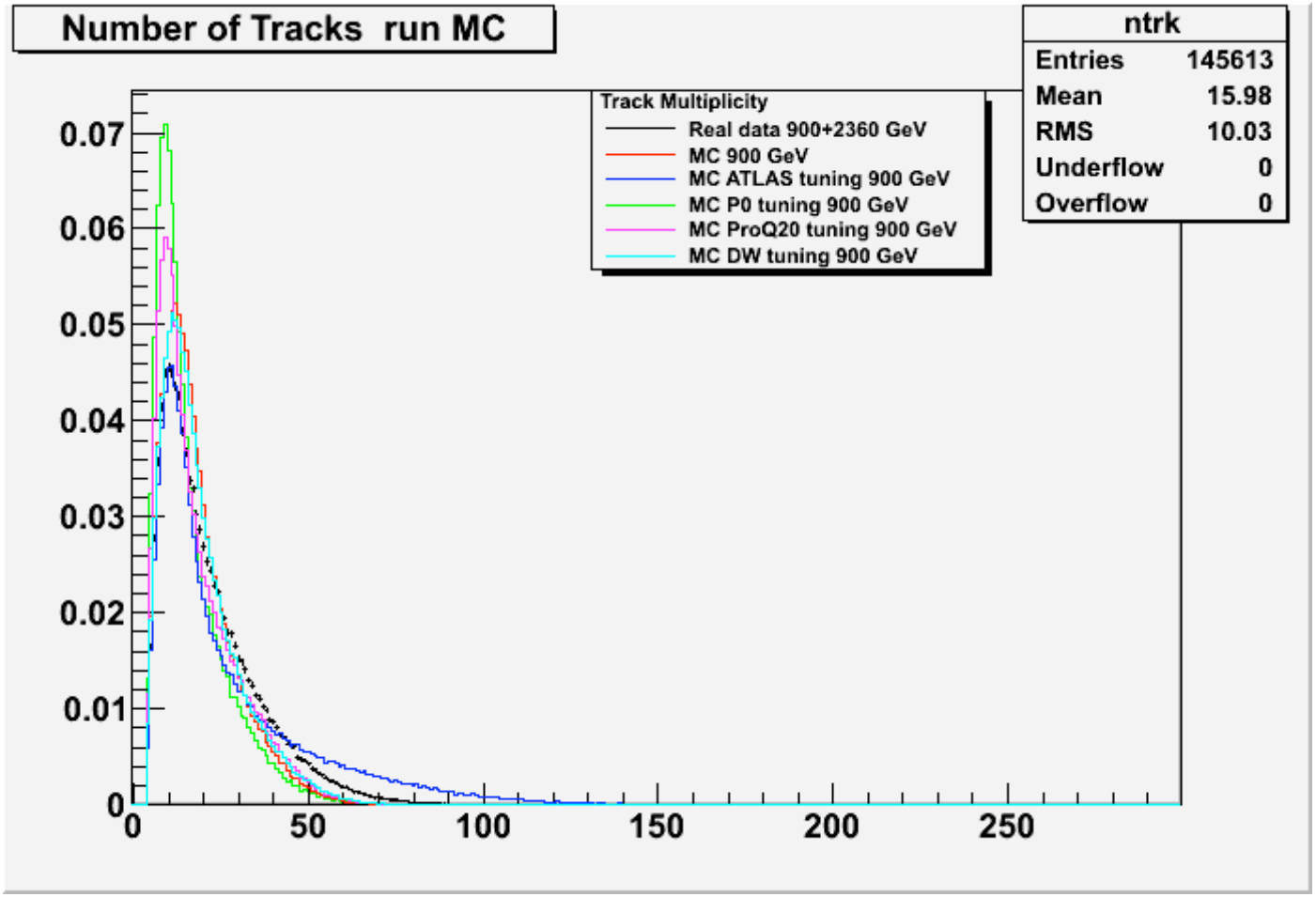
Compare the data and the MC with Pythia Tune D6T/CW900A (2/2)



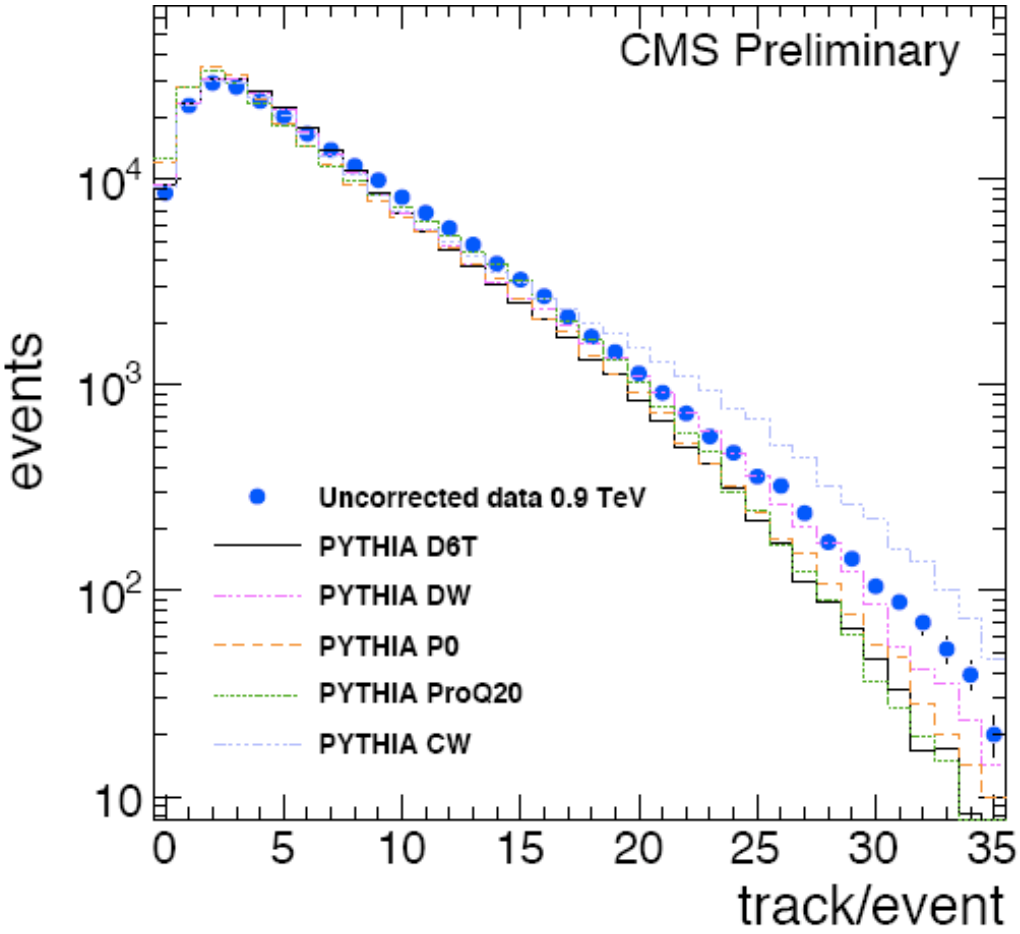


- Track pt distributions normalized by nTracks are comparable between the two MC tunes
- In both tunes, the MC deficit is mainly in the low pT region

Recap: 900GeV data/MC nTracks Difference from Basic Tracking Analysis



Recap: 900GeV data/MC nTracks Difference In UE Analysis



- Many tunes are studied extensively at UE analysis at 900GeV
- It has been found that all tunes except CW underestimate the number of Tracks
- For details, please refer PAS QCD-10-001

Conclusion

- We have compared the basic tracking variables in the Pythia MC with new Tune CW900A with default D6T
- The track multiplicity in the MC with new tune CW900A shows similar discrepancy from the data compared with the default tune D6T
- The other basic tracking variables such as eta and pt are also comparable between the CW900A and D6T
- We understand that it takes a lot effort to tune the MC. Hopefully, these inputs will help in the next round of the MC tuning.