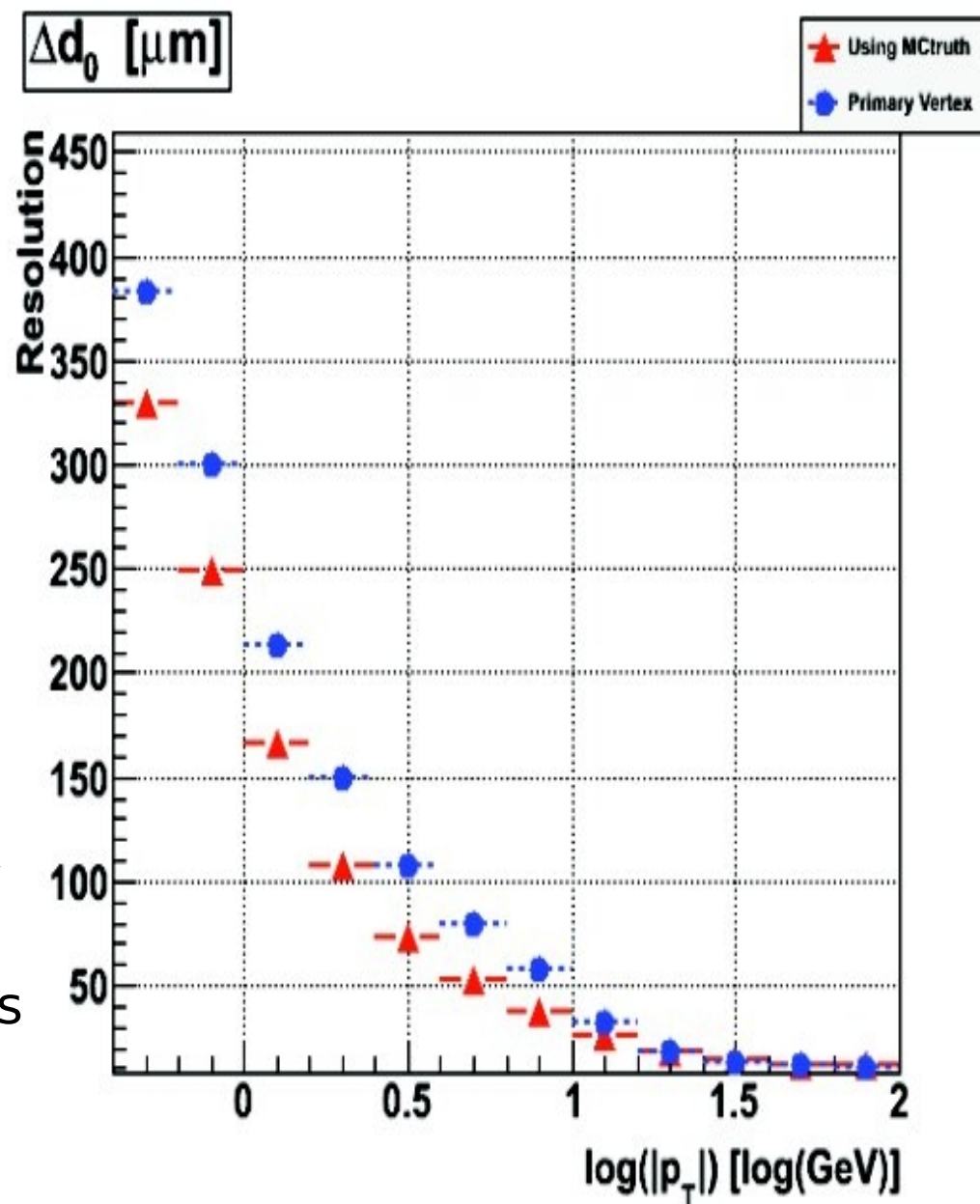


Studies on Tracks Parameters Resolution and implementation in InsituPerformance

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Summary Work

- **Aim:** measure tracking resolution in data and MC.
- Extract resolutions using informations from data
- Fine corrections to apply to MC
- Systematic effects from the MC simulation
- **How?**
Possibility to have residual w.r.t. Primary vertex (PV) and MCtruth (only the first from data!):
- 3 variables per track: d_0 , z_0 , $z_0 \sin(\theta)$ as function of $\log(|p_T|)$, η ;
- 3 different type of values: MCtruth/MC, PV/MC, PV/data
- From the comparison of the 3 values we extract the resolutions on data and MC/data corrections.



Samples and selections

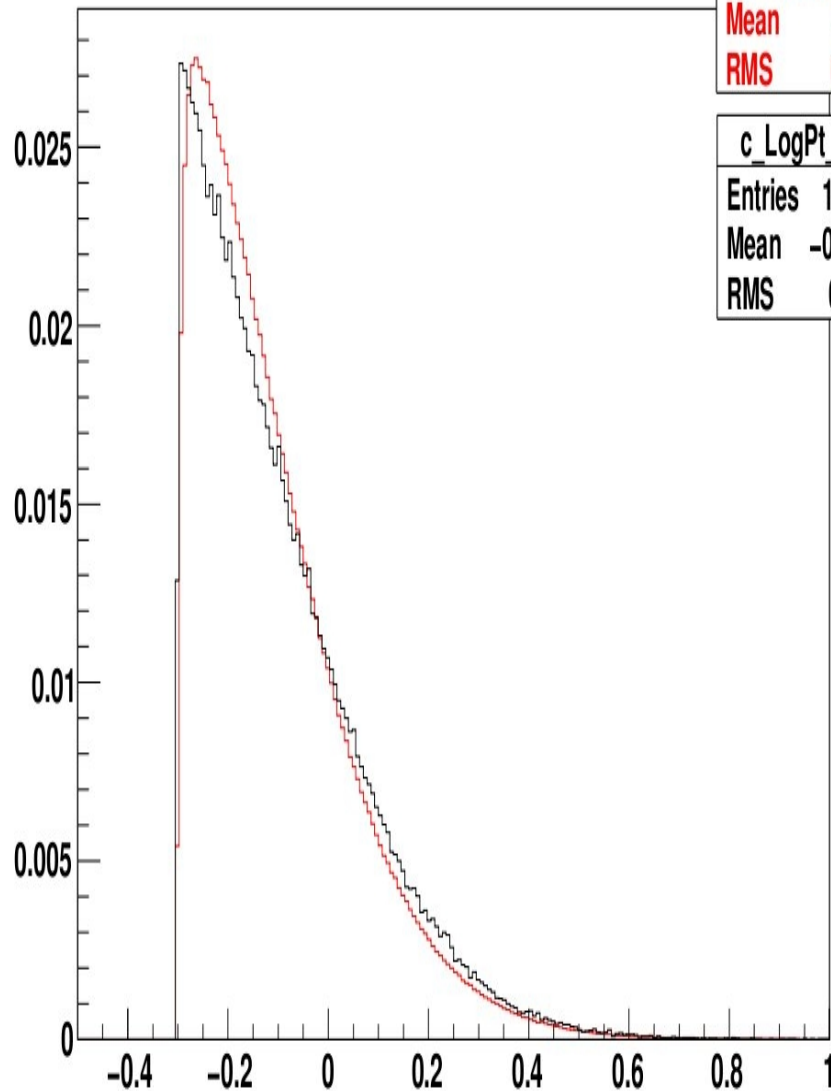
- Samples:
 - MC dataset (**~1M events**):
mc09_900GeV.105001.pythia_minbias.recon.ESD.e466_s604_s582_r849
 - Data dataset (**~21k events**):
data09_900GeV.00141749.physics_MinBias.recon.ESD.f187 (LB 19-100)
data09_900GeV.00141811.physics_MinBias.recon.ESD.f187 (LB 126-165)
- Package and release selections (**same for data and MC!**):
 - package:
InnerDetector/InDetExample/InDetRecExample
(tag:**InDetRecExample-01-19-10**; particular loose cuts to increase efficiency in early analysis)
 - release: **15.5.3.11, AtlasTier0**

What we can do (at the moment)...

- Preliminary analysis:
 - Creation of a new set of histograms and trees only with interesting info as, for example, tracks parameters w.r.t Primary Vertex or MCtruth...
 - Fast and immediate comparison between data and MC informations and plots applying cuts (# of Pixel Hits, # of tracks per event, Pt, eta, etc...)
- These studies lead us to understand how (and what) we have to implement in InsituPerformance package

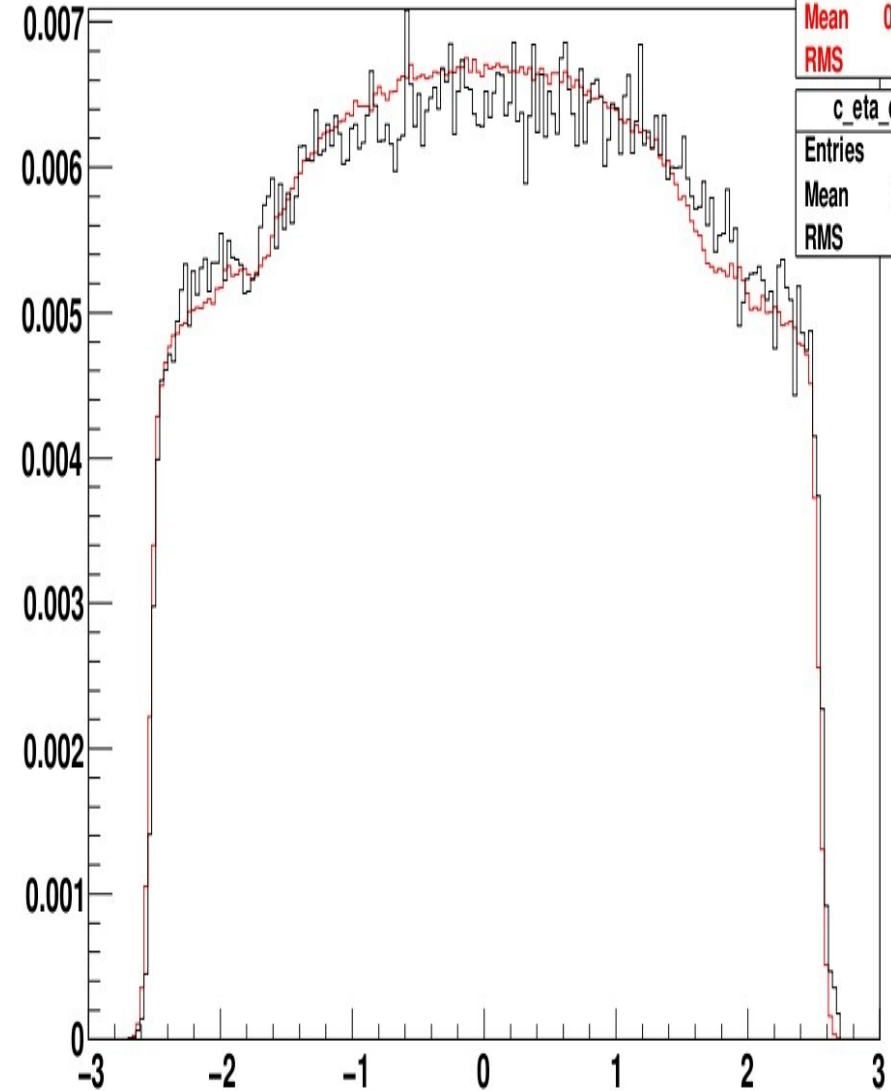
Pt and eta distributions

LogPt



c_LogPt_mc	
Entries	5852452
Mean	-0.109
RMS	0.1531
c_LogPt_data	
Entries	142614
Mean	-0.09942
RMS	0.1644

η



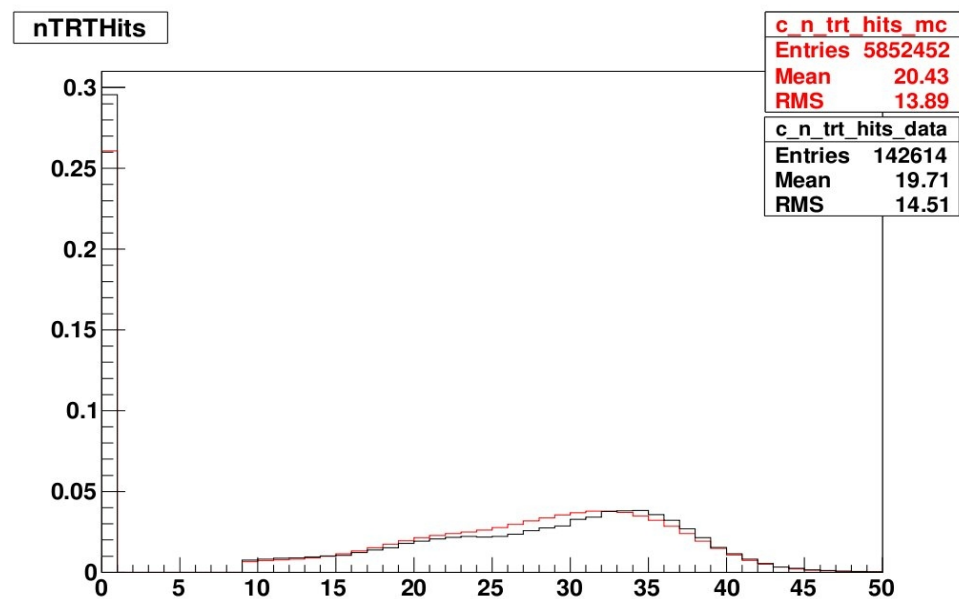
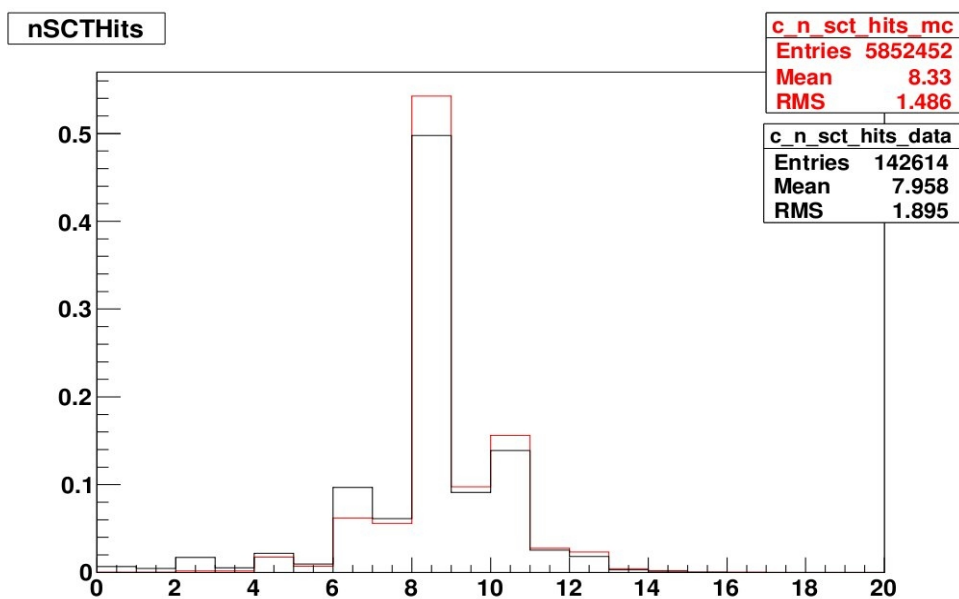
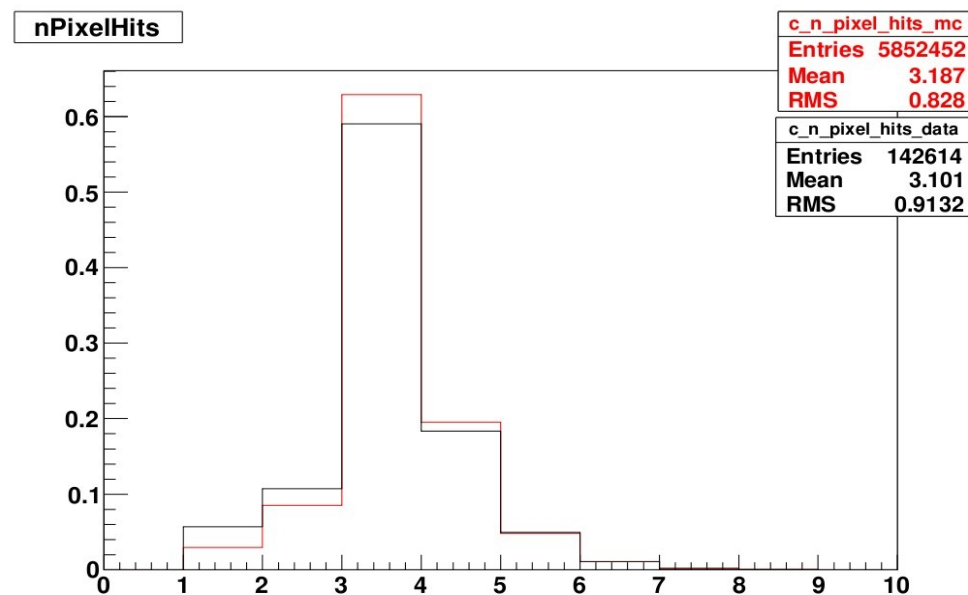
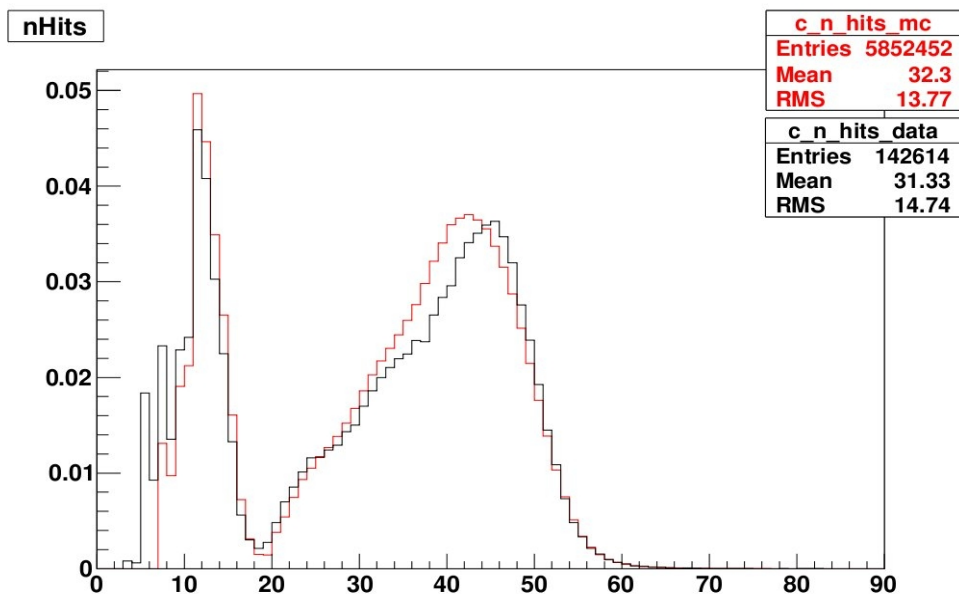
c_eta_mc	
Entries	5852452
Mean	0.005301
RMS	1.388
c_eta_data	
Entries	142614
Mean	0.02919
RMS	1.403

- MonteCarlo
- Data

- MonteCarlo

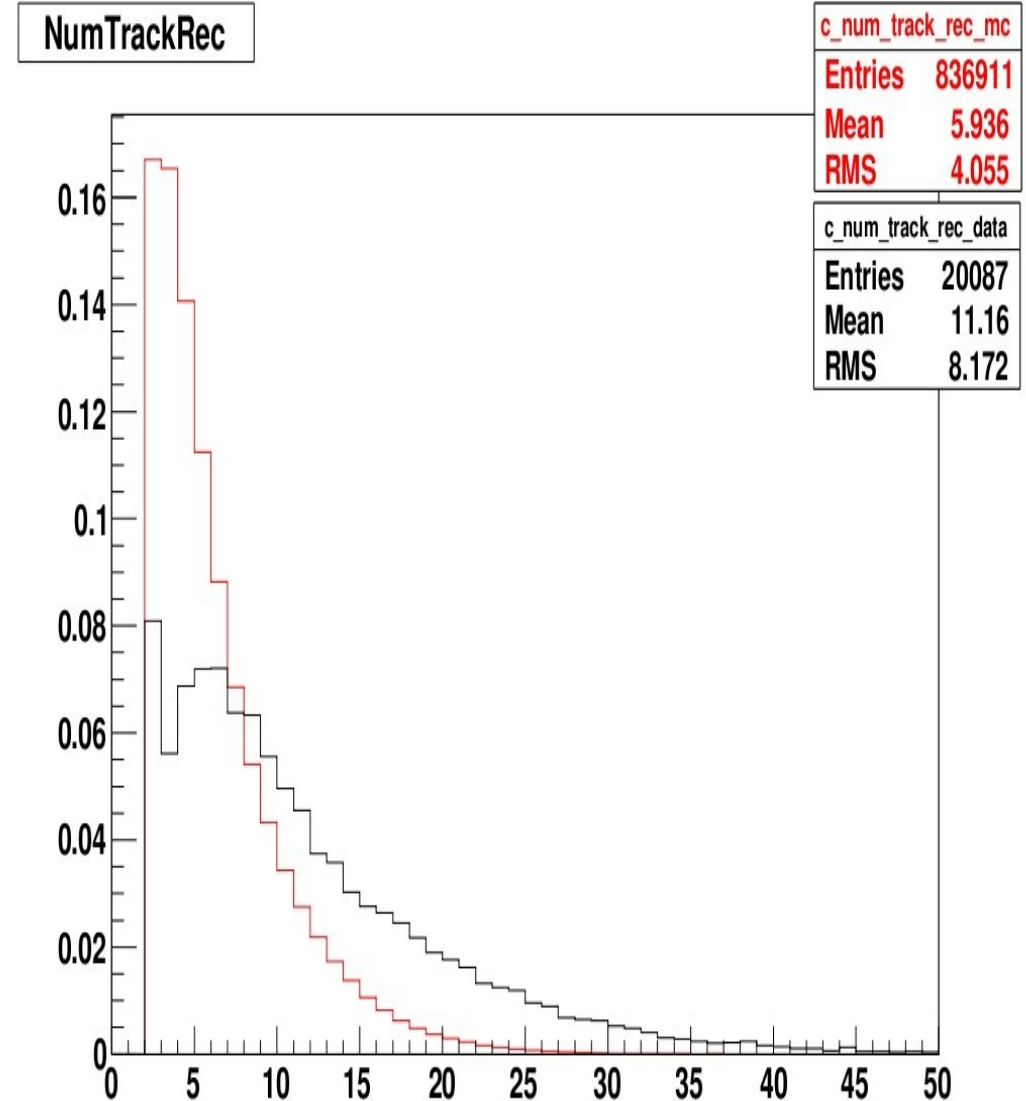
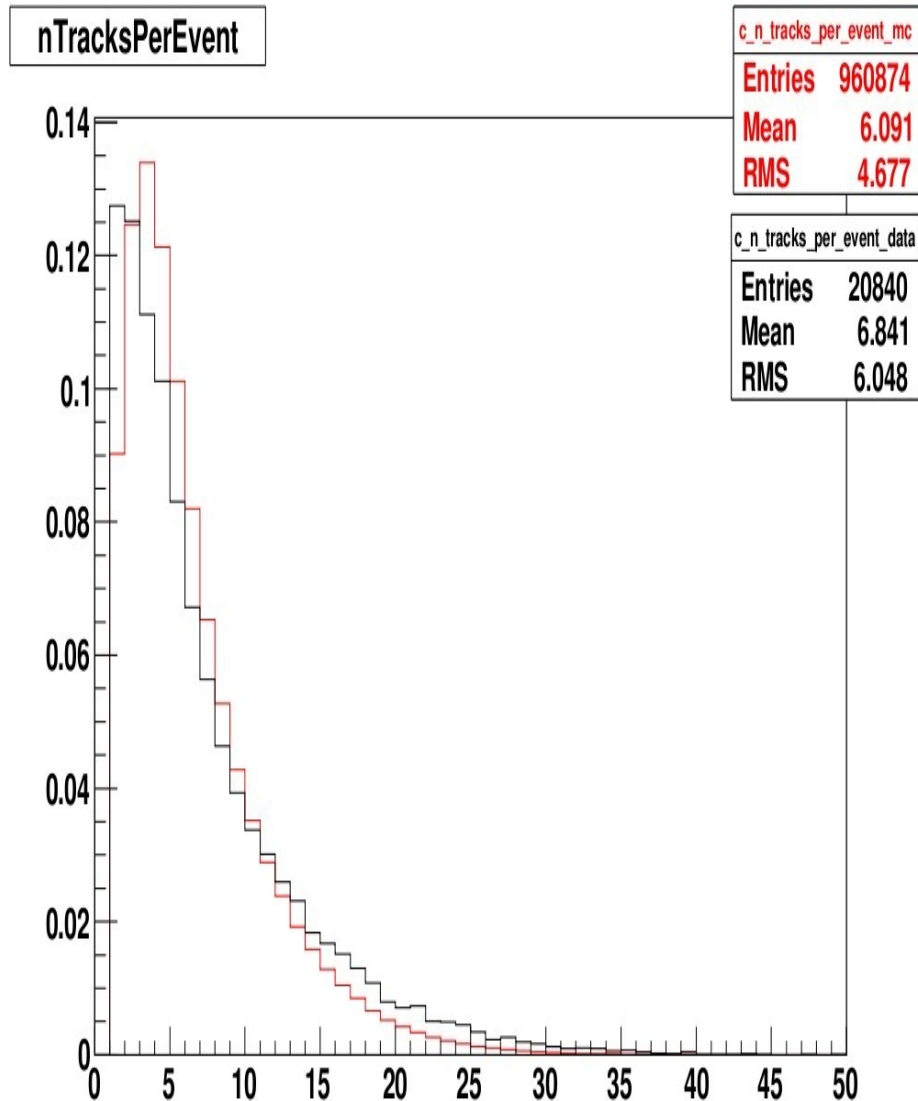
- Data

Hits distributions

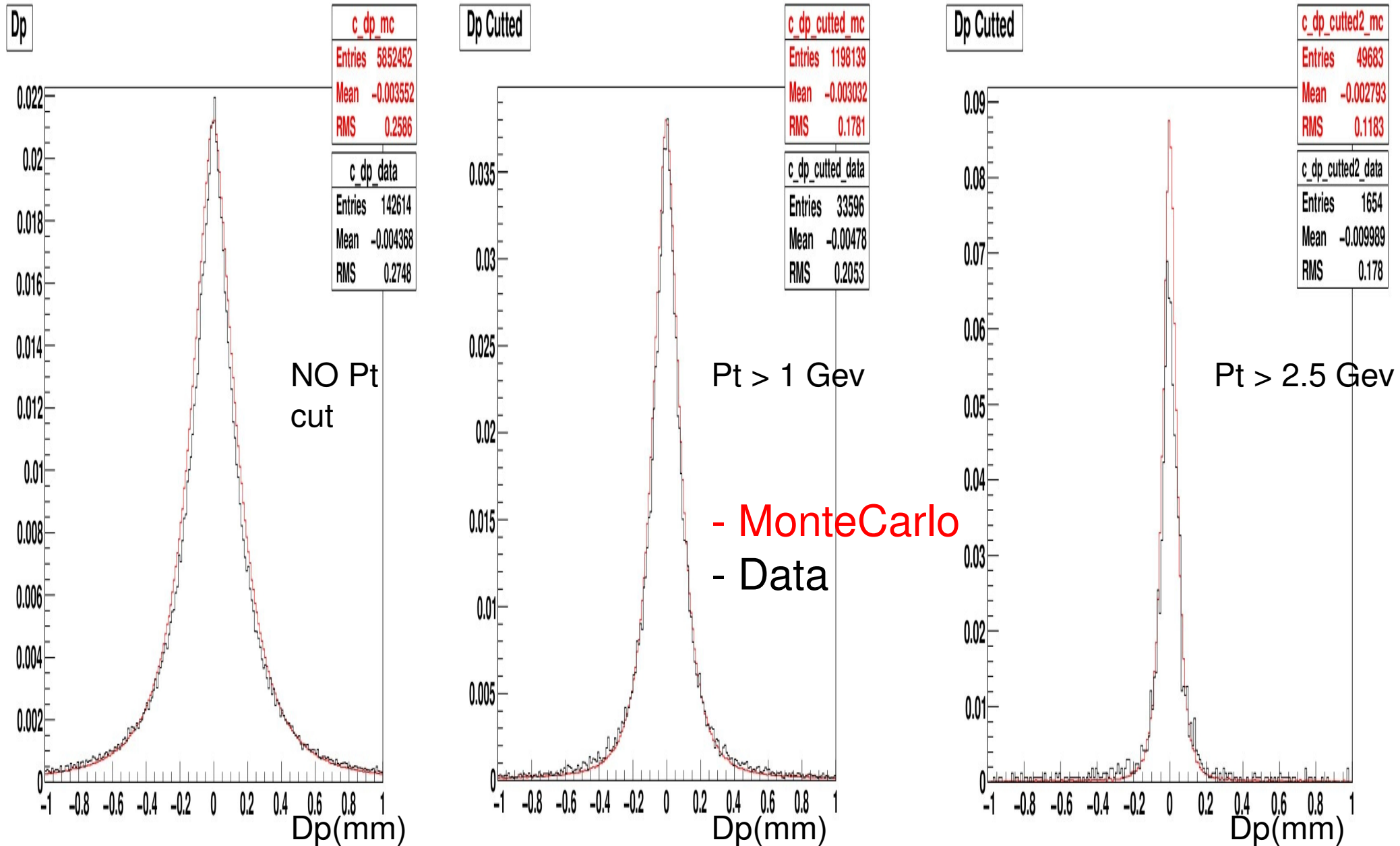


tracks per event & # tracks used in PV reconstruction

- MonteCarlo
- Data



Impact parameter w.r.t Primary Vertex



InsituPerformance Implementation

- **Recent talk** at P&P Week:
<http://indico.cern.ch/contributionDisplay.py?contribId=12&confId=74024> (2/12/09)
- Modification of the **InsituPerformance** package (**InsituIDTrackPerformance**)
 - We fit each residual distributions
 - All plots are accessible from a html page,
ex: <http://lxmi.mi.infn.it/~lazzaro/Atlas/resolutions/>

[Fits d0 Distributions](#)

[Fits dpv Distributions](#)

[# Entries](#)

[Distribution Overall Resolution for Primary Vertex Position](#)

[Distribution Overall Resolution](#)

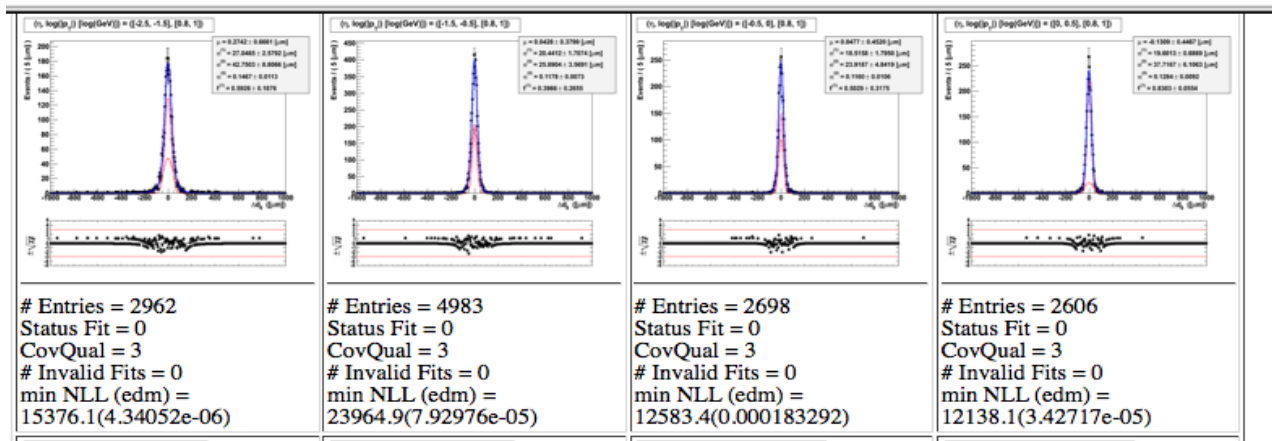
[Profiles](#)

[Resolution values per each matrix entry](#)

[Ratio Resolution \(Primary Vertex / Using MCtruth\)](#)

[Fits z0 Distributions](#)

[Fits zpv Distributions](#)



Frame in red in case of problem in the fit (or points with chi2)

Work in progress

- **Event selection level:**
 - Apply few selection cuts on the tracks (minimum bias events)
 - Remove the tracks used in the secondary vertex
 - Divide the tracks depending on their hits configuration
 - Refit the primary vertex removing tracks (i.e. not use the track for the primary vertex and track resolution determination)
- **Analysis level:**
 - Understand differences between data and MC
 - Look at the “low Pt tracking Ntuples”
 - Analyze 2.36 TeV data
 - Try better configuration (new PDFs) for the fits
 - Improve the html page
 - Fit the resolutions values in order to have a continuous function for the resolution values as function of the other variables