

Beam Halo in data - update

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DESY/UniHH Alignment meeting

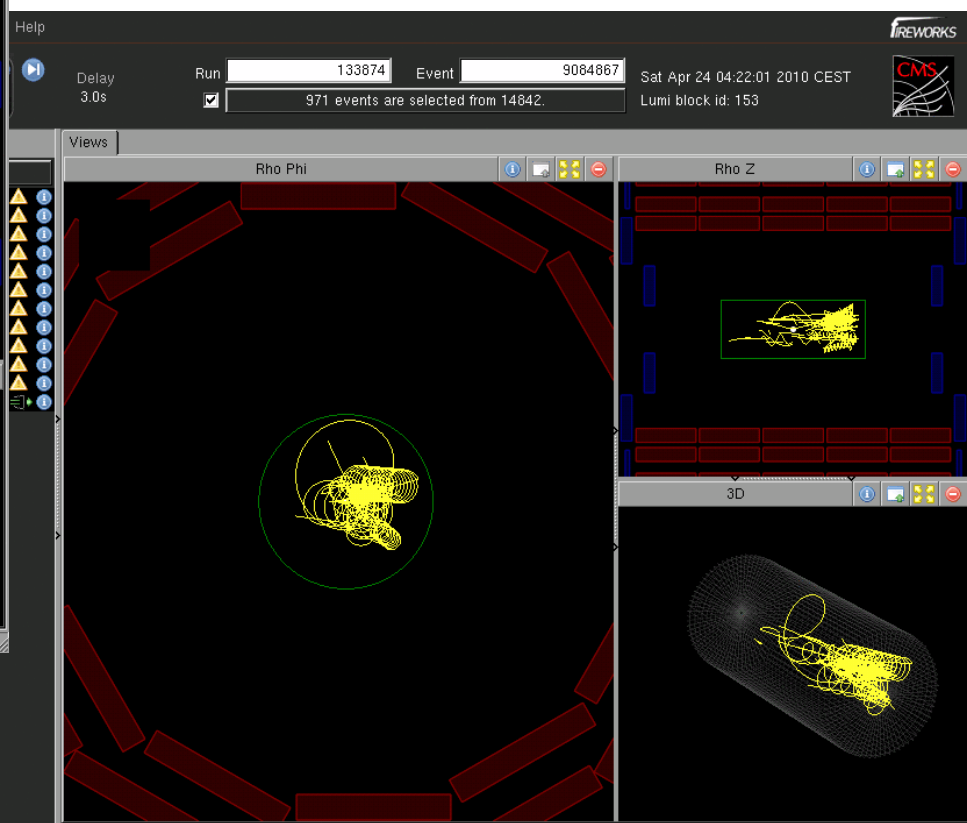
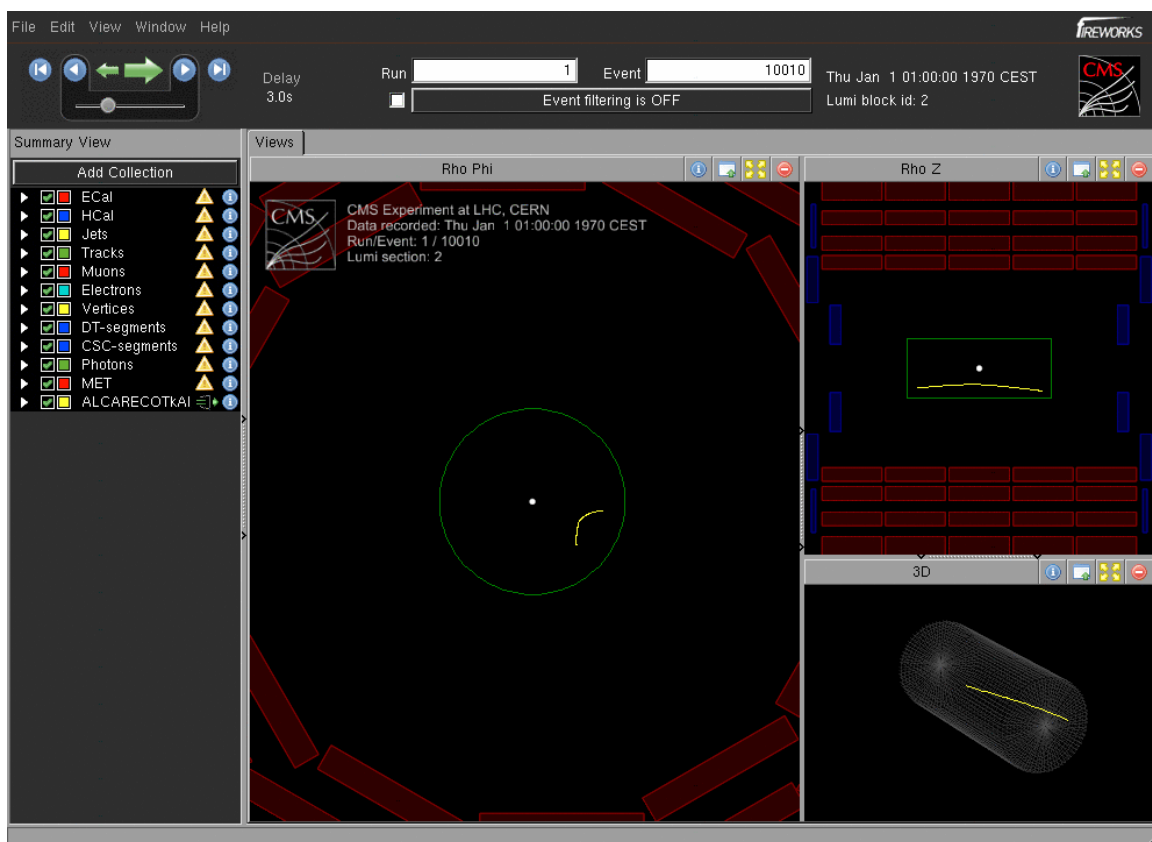
17/08/2010

Data sample

- Dataset:
 - /Cosmics/Commissioning10-StreamTkAlBeamHalo-v9/ALCARECO
- Run Range: 133537-135802 (19.04-19.05.2010)
- Number of events: 373145
 - only runs with > 1000 events have been analyzed
- Beam Halo MC:
 - /BeamHalo/Summer09-STARTUP31X_V7_StreamTkAlBeamHalo-v1/ALCARECO
 - 100k events have been analyzed

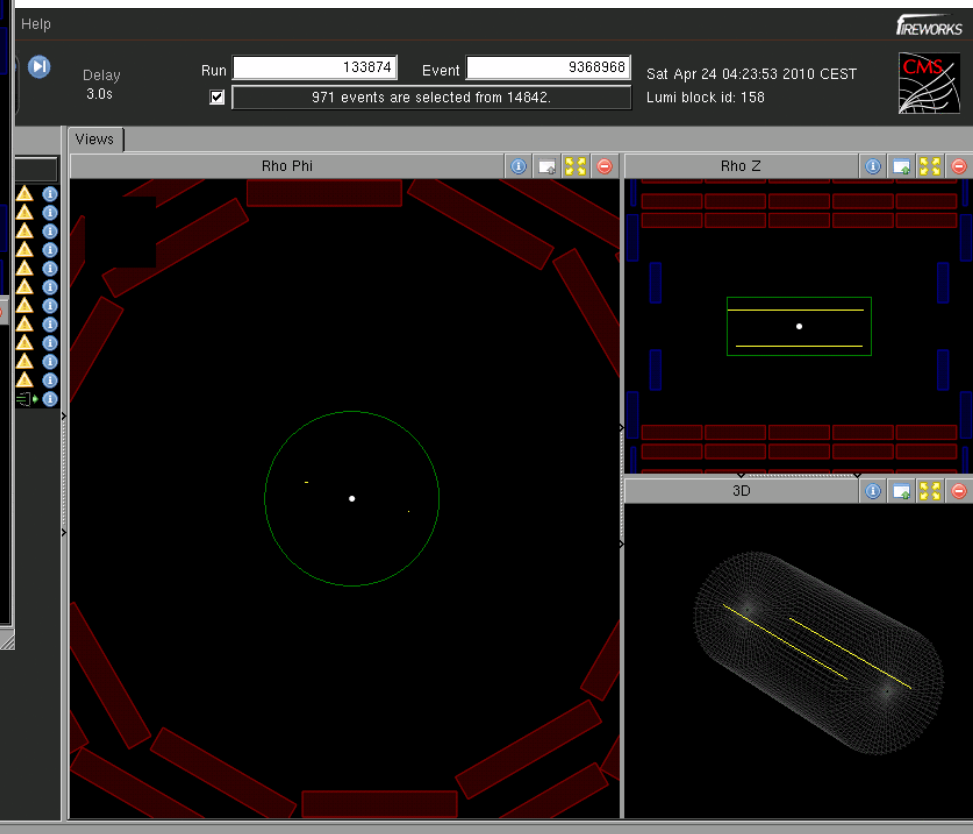
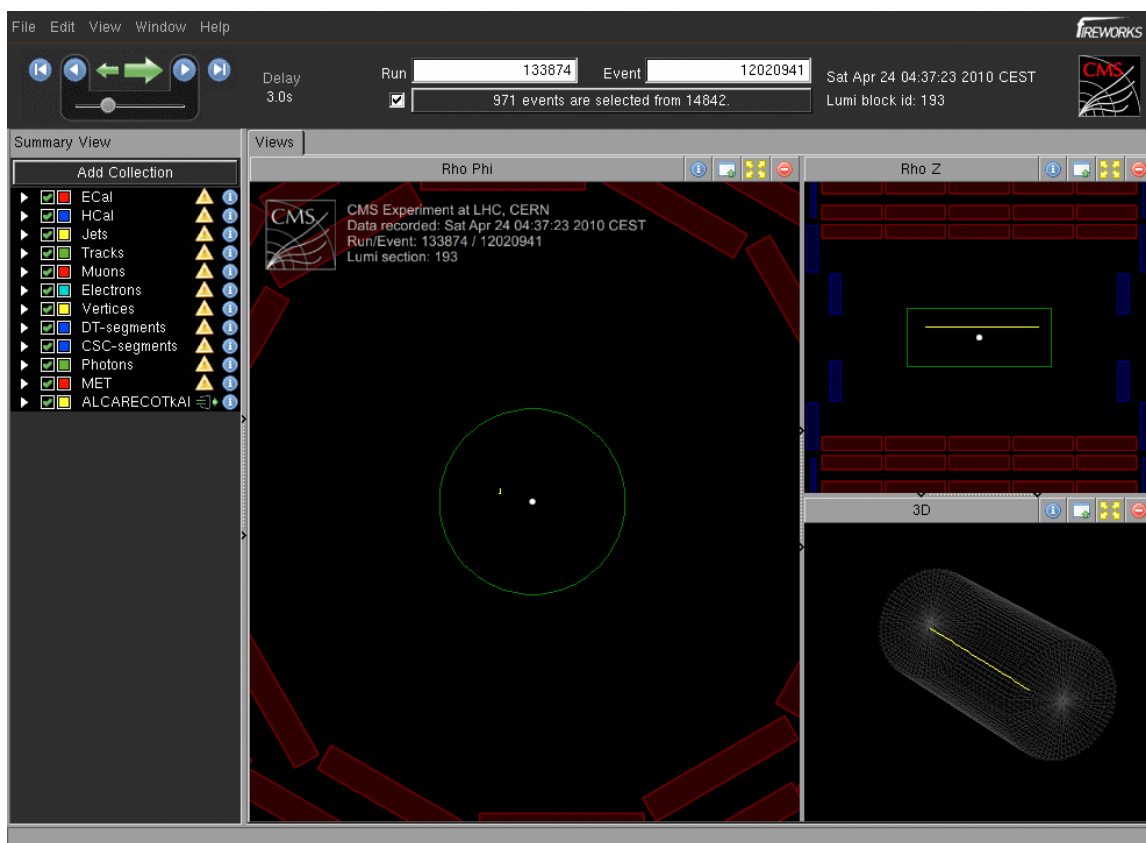
How do BH events look like?

- A typical MC event:
- ... and a typical event in data:



How do BH events look like?

- ... but in data there are also events like these:



Event + Track selection

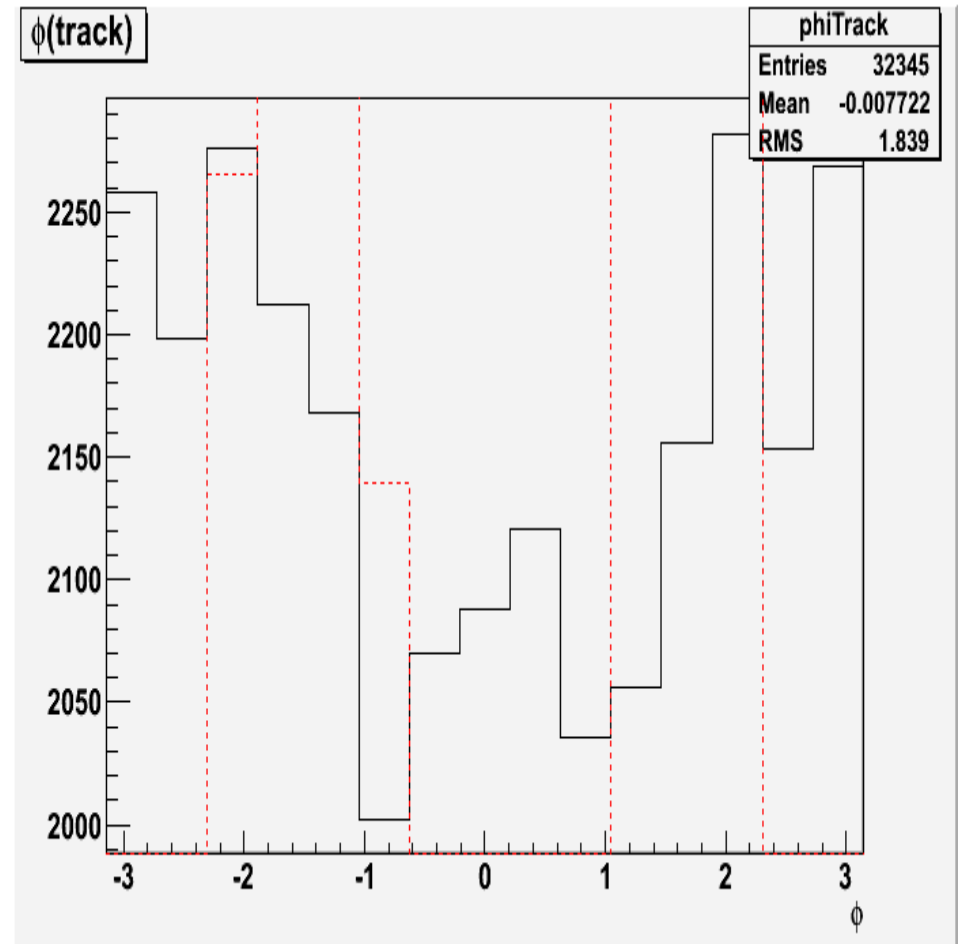
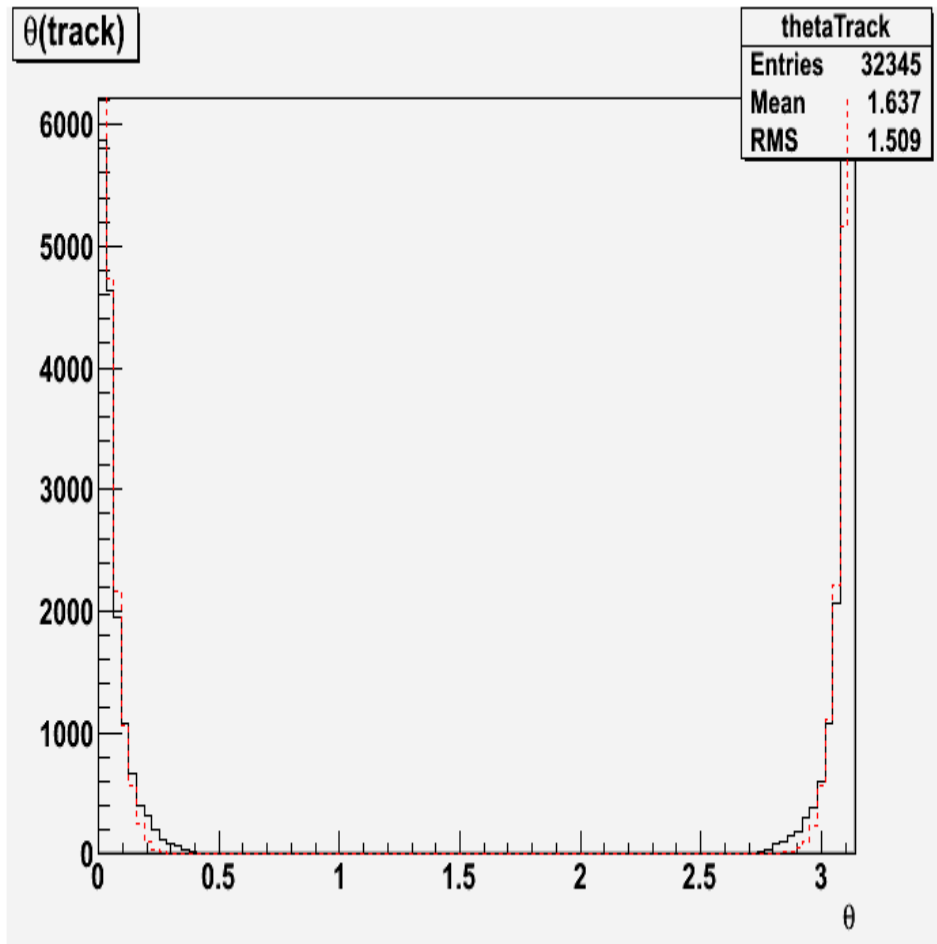
- Event election (data only):
 - $0 < n_{Trk} < 3$ AND/OR Trigger bit (36 OR 37 OR 38 OR 39)
- Track selection:
 - TrackRefitterBHM
 - $p_{Min}=2.5$
 - $n_{HitMin}=8$
 - $minHitsPerSubDet.inENDCAPplus=1$
 - $minHitsPerSubDet.inENDCAPminus=1$

Distributions: selection 1

- Same selection as 10/08/2010
- Sample:
 - Commissioning10-StreamTkAlBeamHalo-v9
- Selection:
 - only runs with ≥ 1000 evts
 - Trg. selection: bit 36 || 37 || 38 || 39
- Selected tracks: 32345
- See backup for more distributions

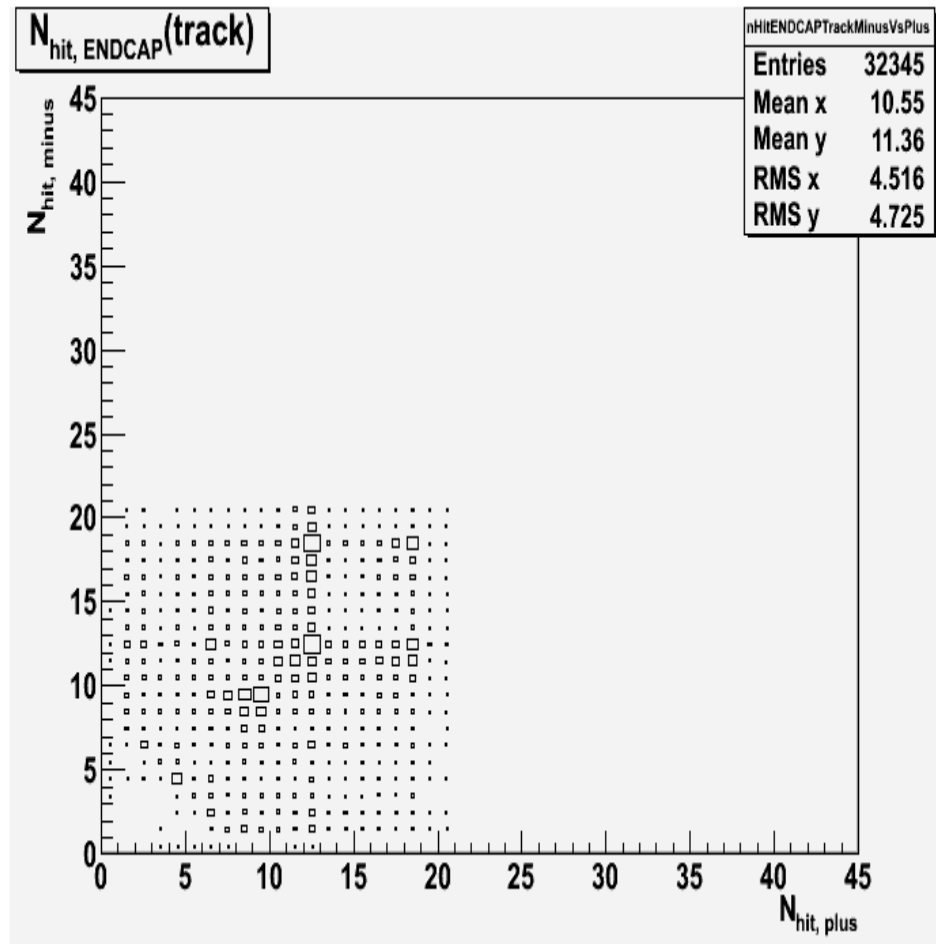
Angular distributions

- Black solid line: data
- Red dashed line: MC

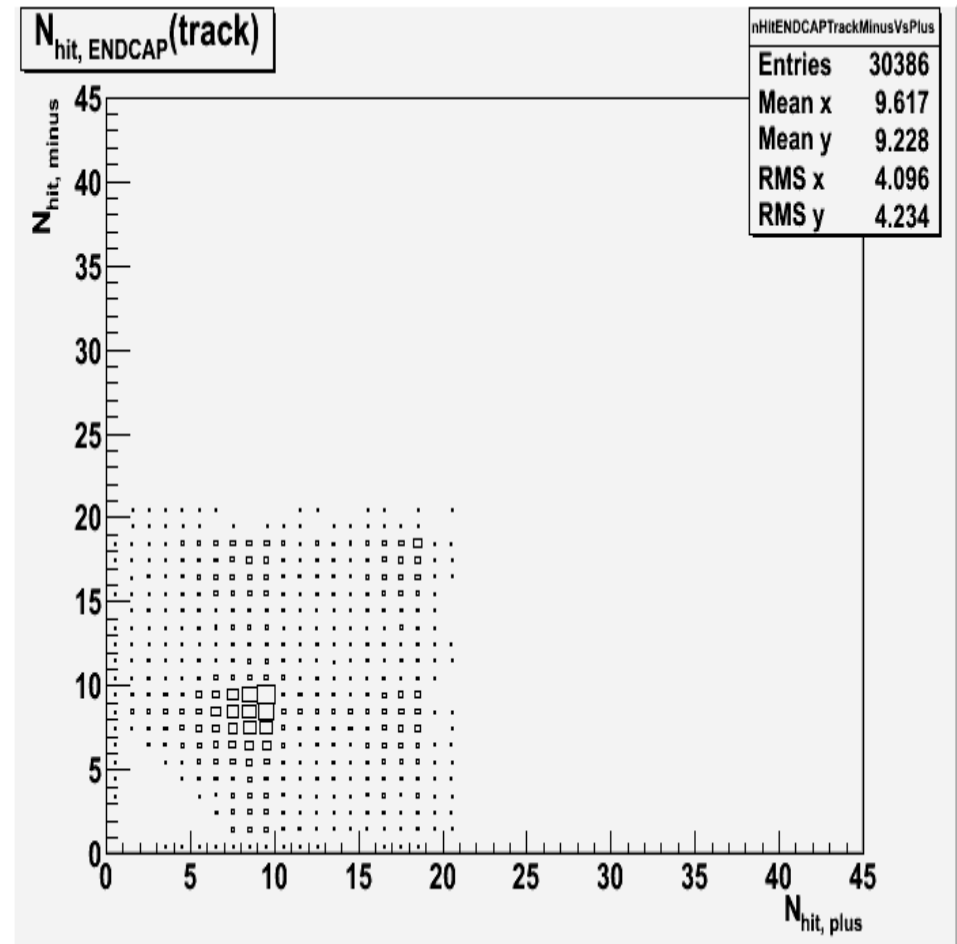


N_hits distributions

- Data:

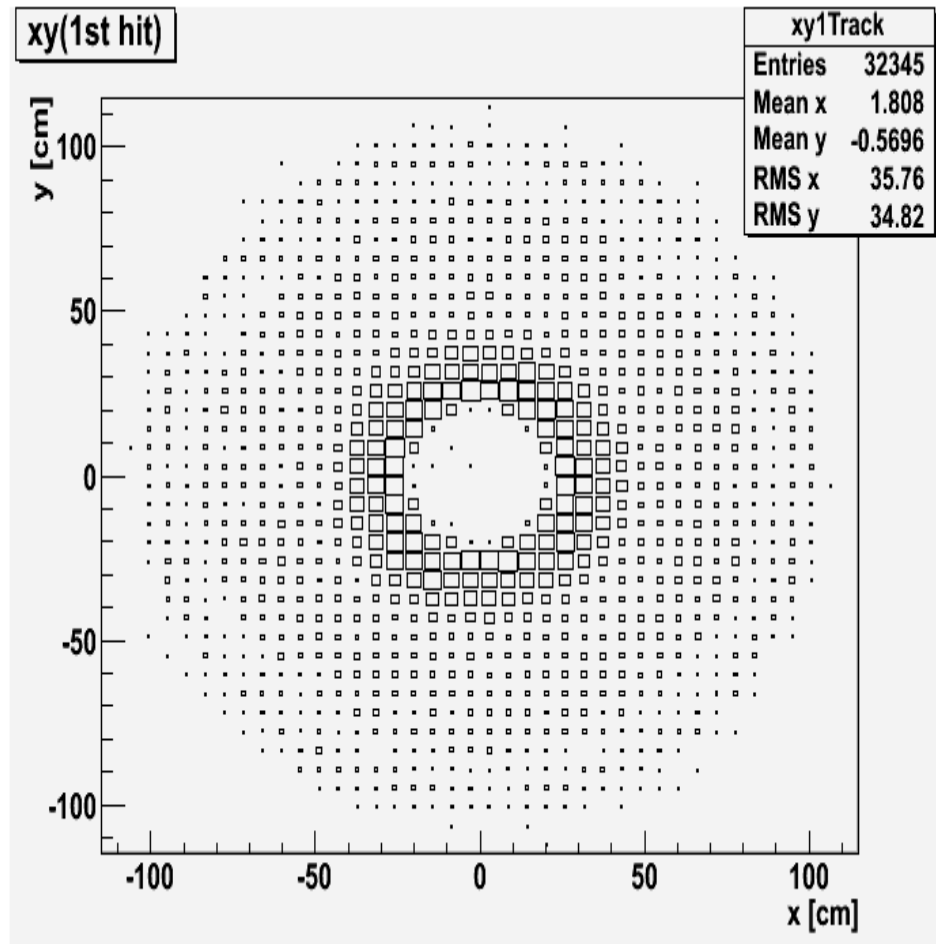


- Monte Carlo:

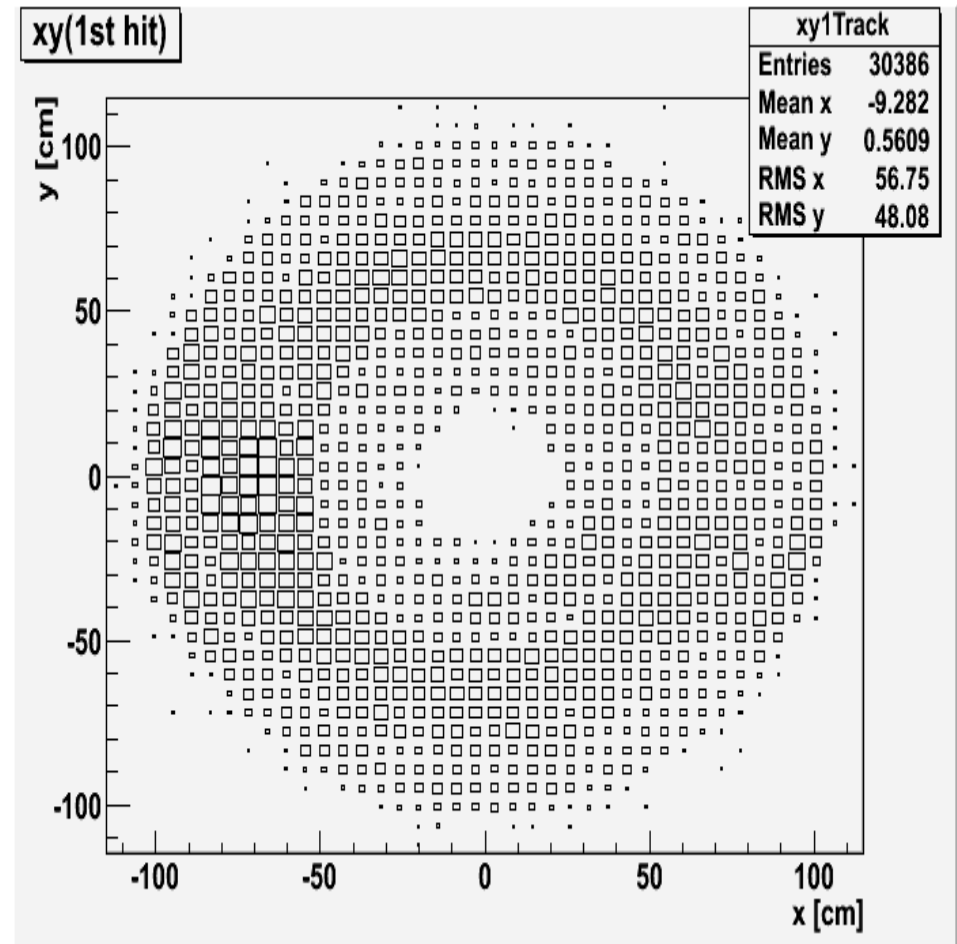


First hit distributions

- Data:

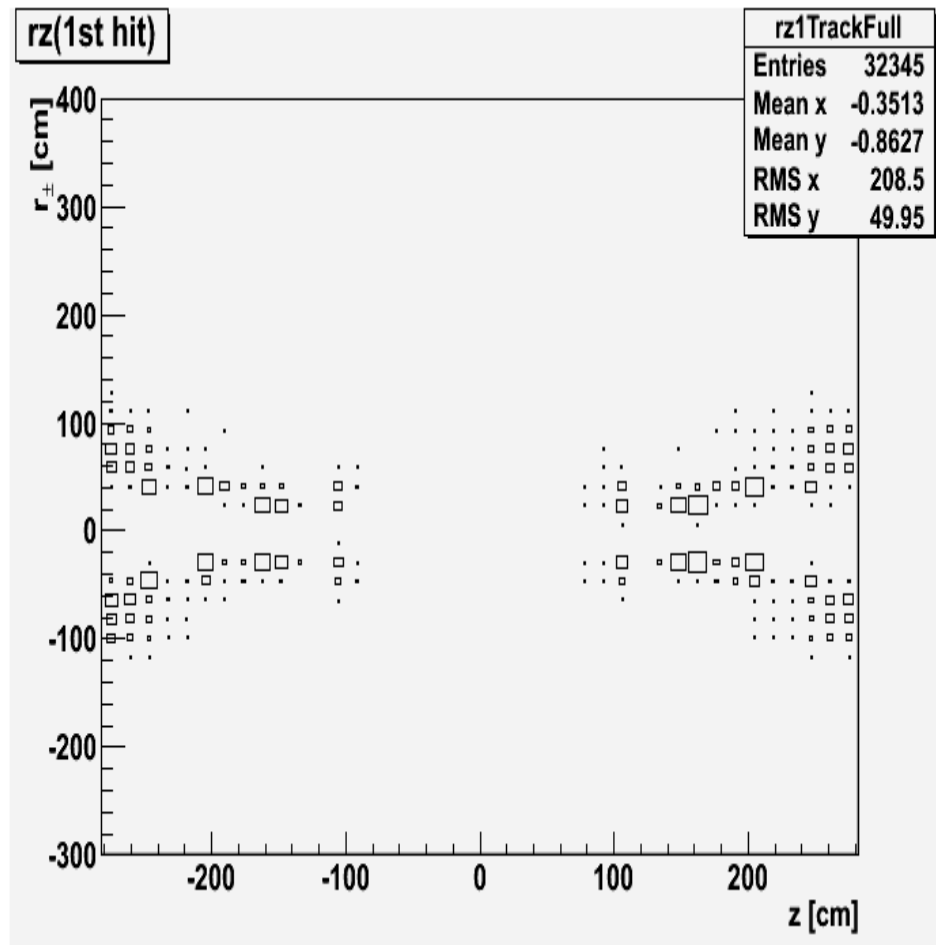


- Monte Carlo:

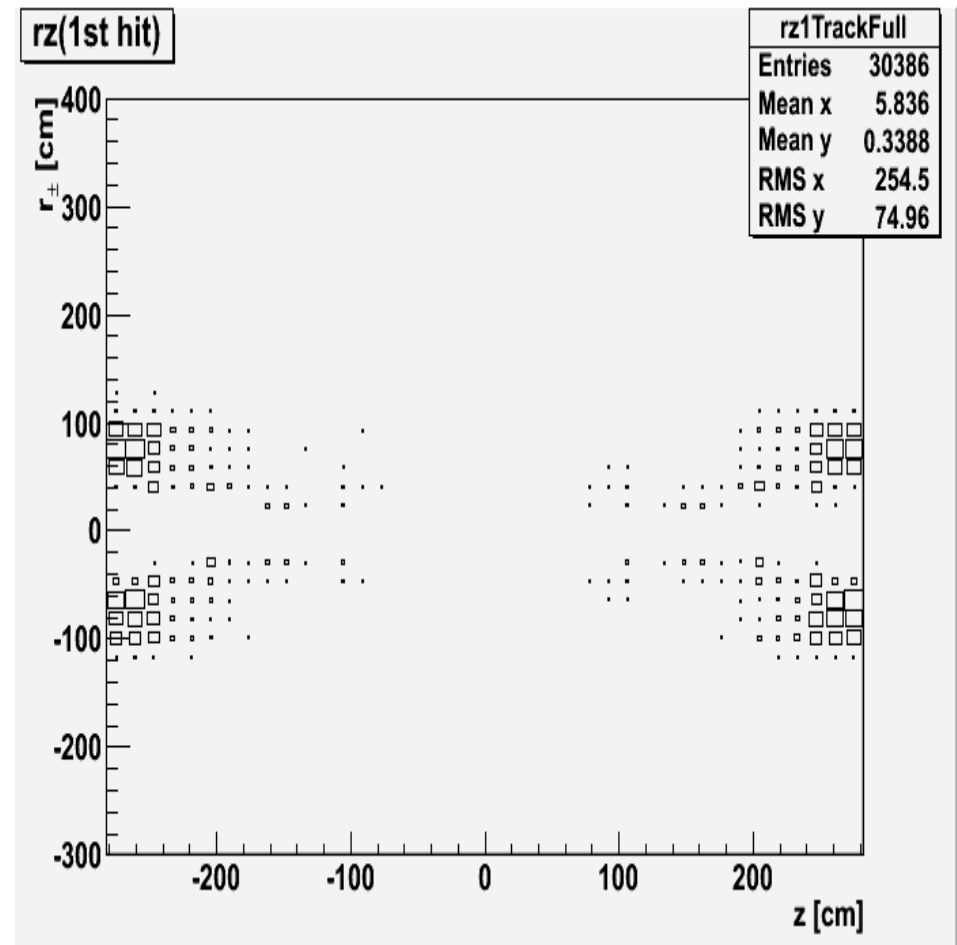


First hit distributions

- Data:



- Monte Carlo:



Comments to selection 1

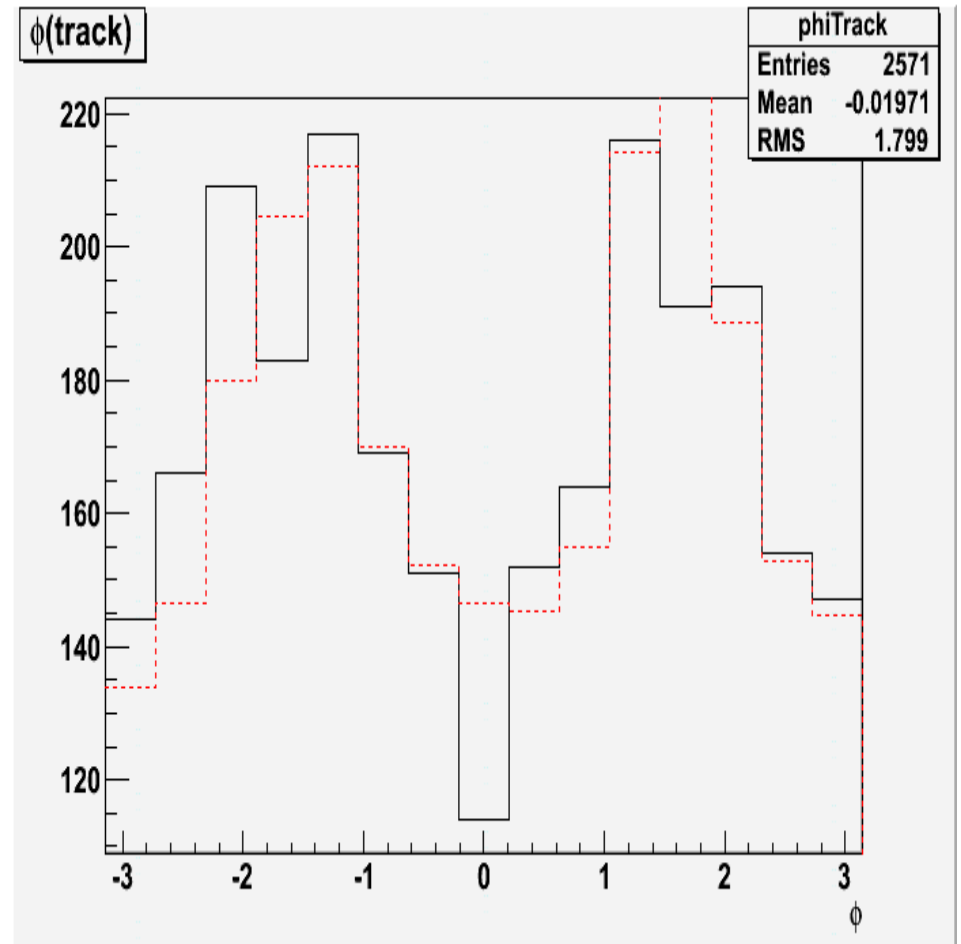
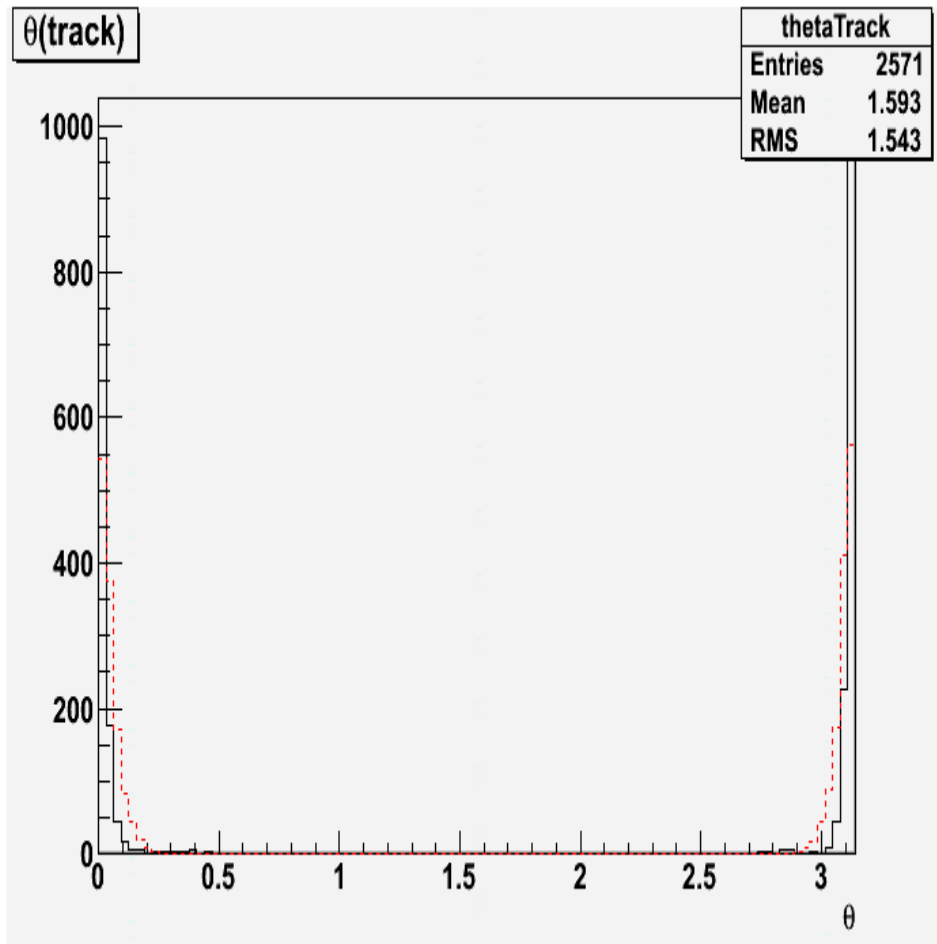
- In comparison to MC:
 - phi distribution looks different
 - different regions are populated in the N_hit correlation plot
 - the first hit tends to be more in the inner detectors (in terms of radius), and less in the outer ones (in terms of z)

Distributions: selection 2

- Sample:
 - Commissioning10-StreamTkAlBeamHalo-v9
- Selection:
 - only runs with ≥ 1000 evts
 - $0 < nTracks < 3$
 - Trg. selection: bit 36 || 37 || 38 || 39
- Selected tracks: 2571
- See backup for more distributions

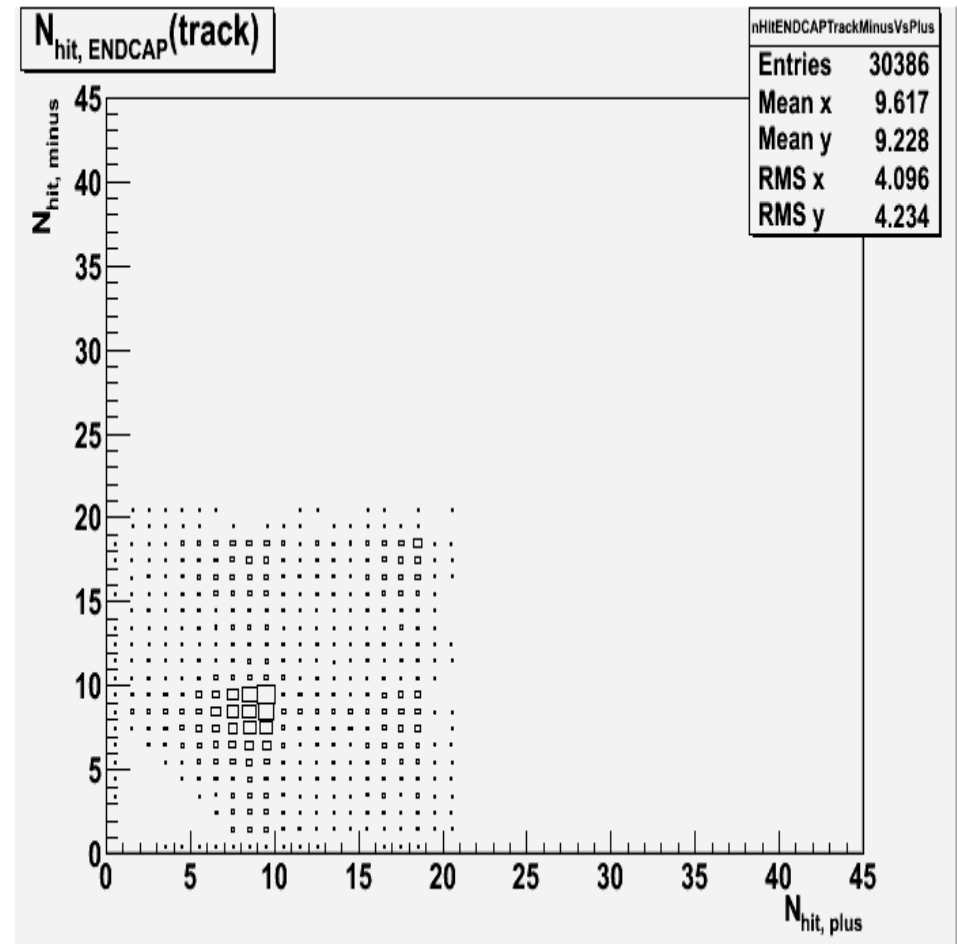
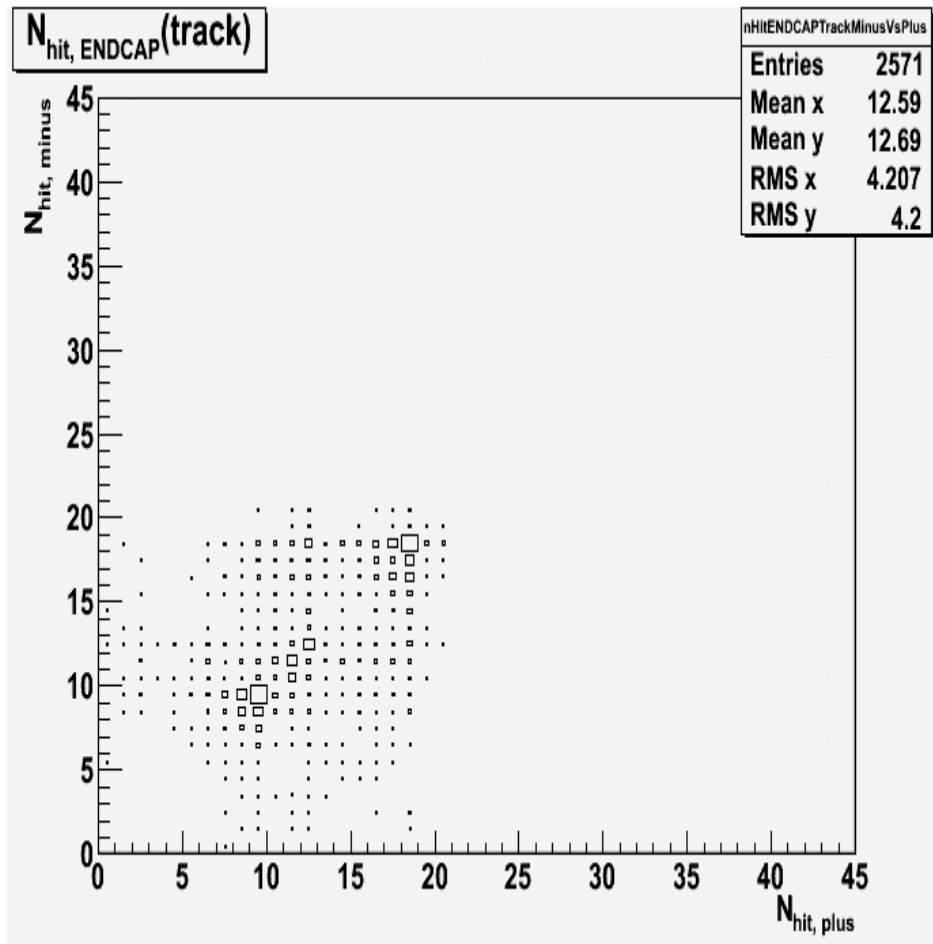
Angular distributions

- Black solid line: data
- Red dashed line: MC



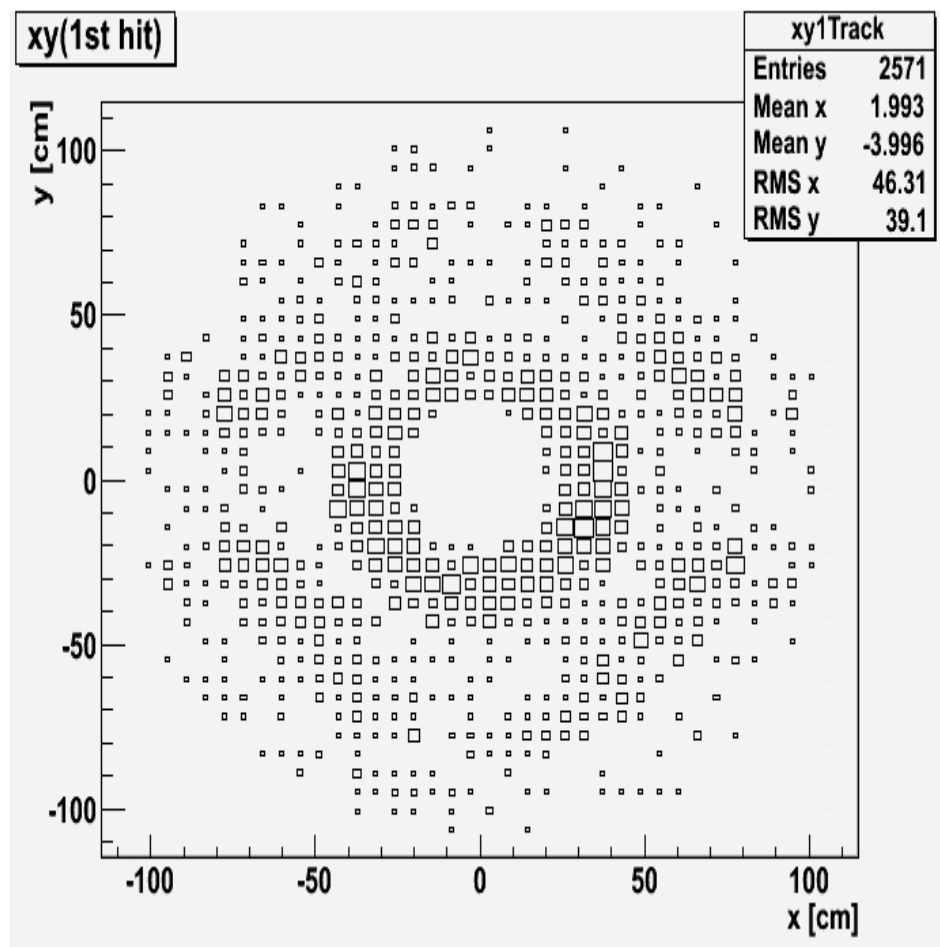
N_hits distributions

- Data:
- Monte Carlo:

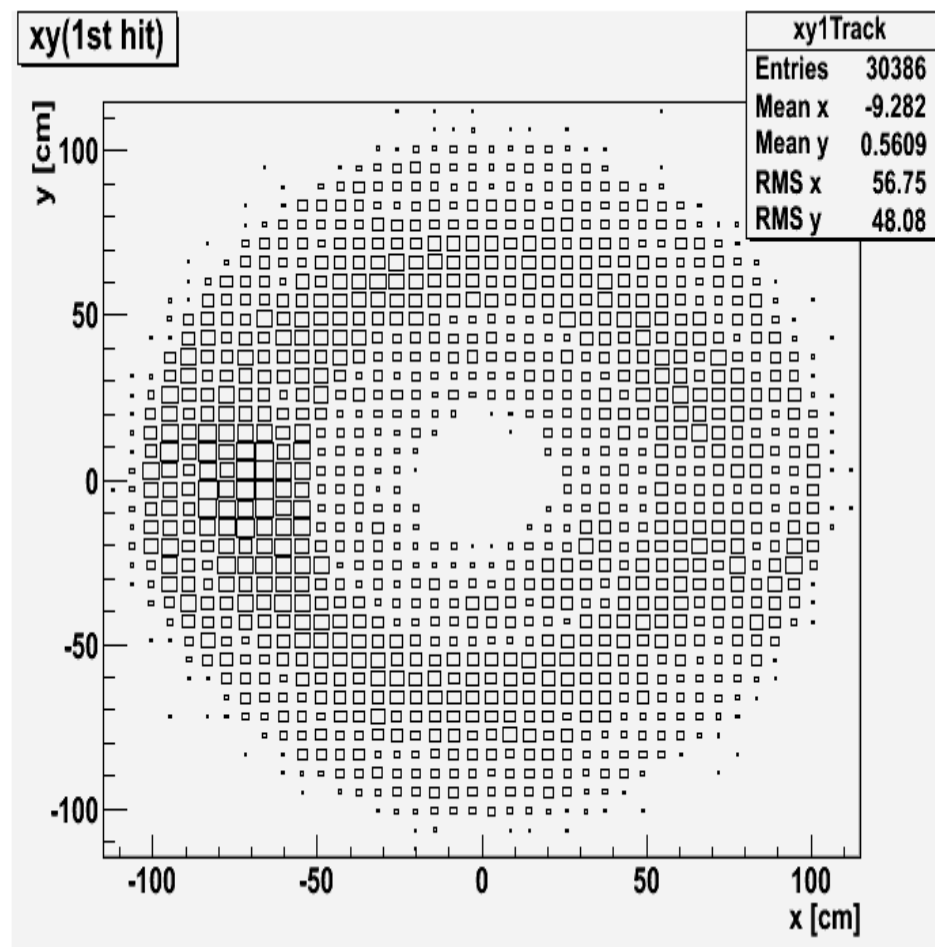


First hit distributions

- Data:

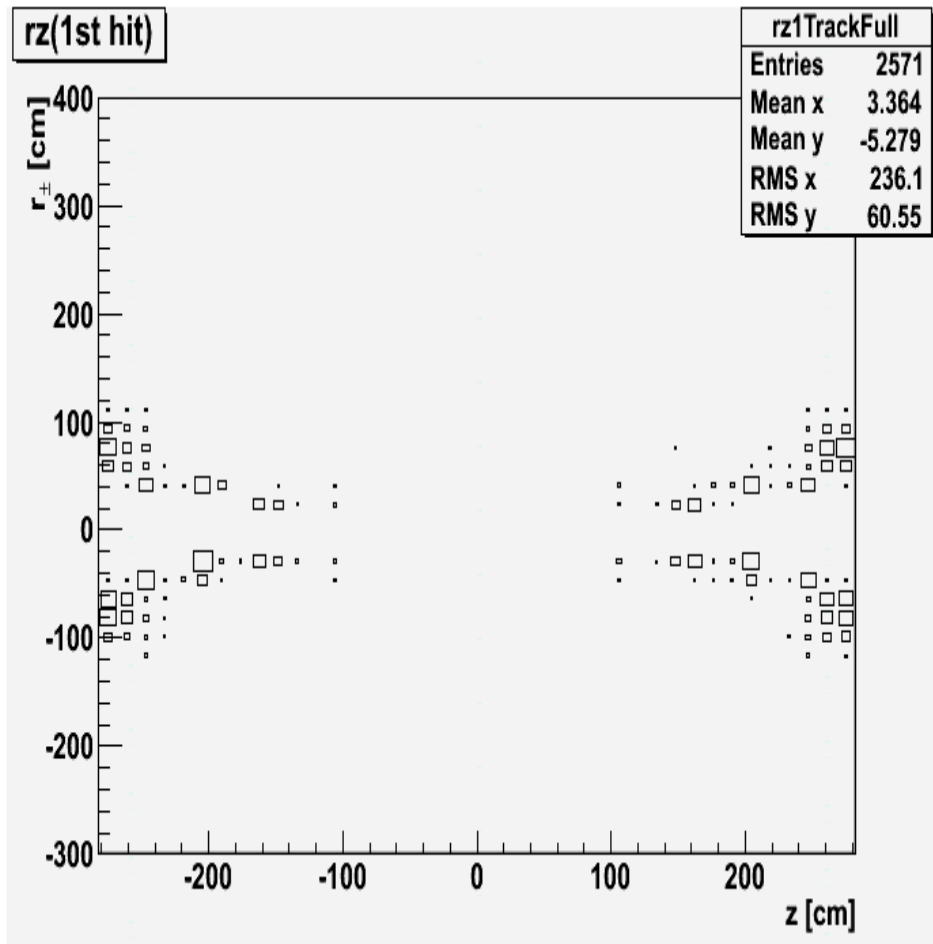


- Monte Carlo:

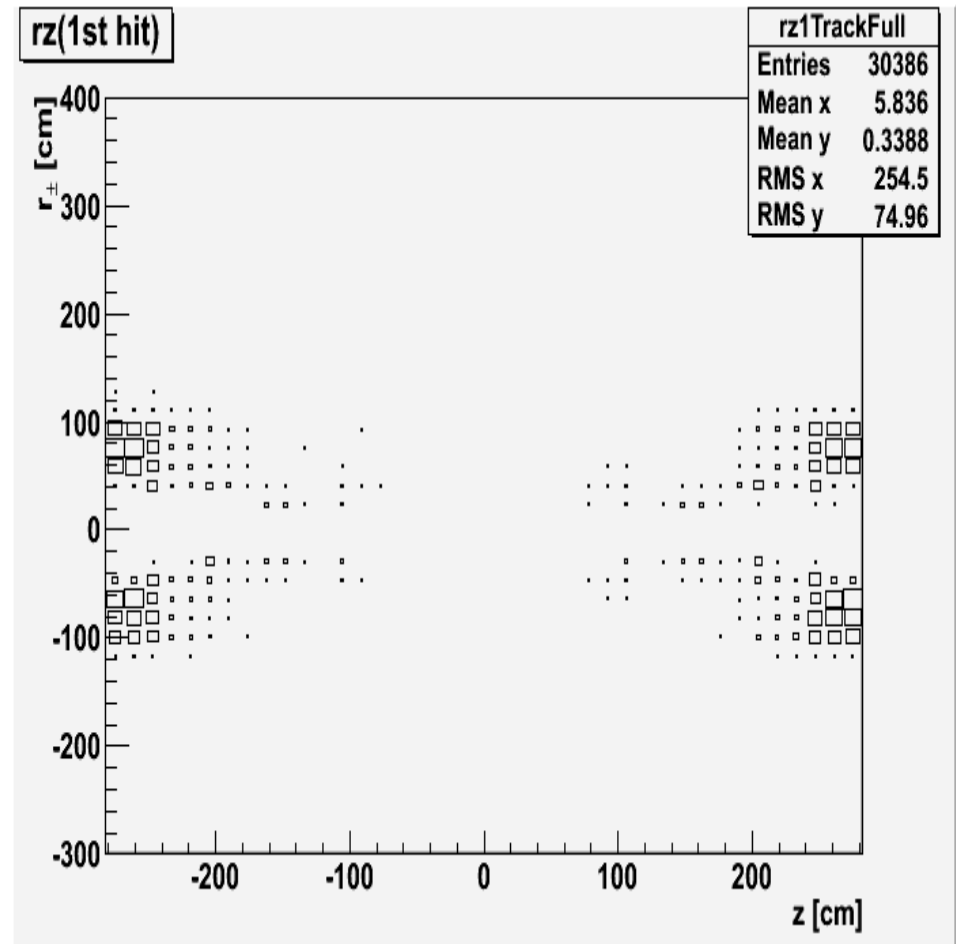


First hit distributions

- Data:



- Monte Carlo:



Comments to selection 2

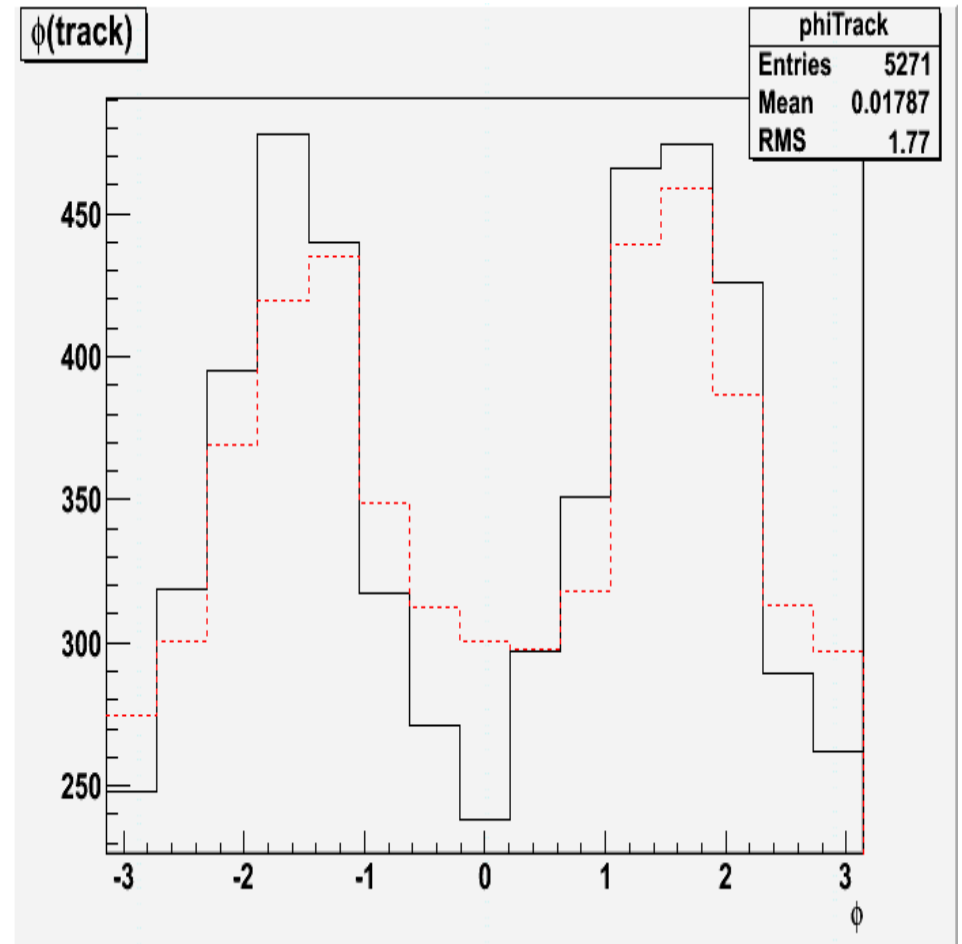
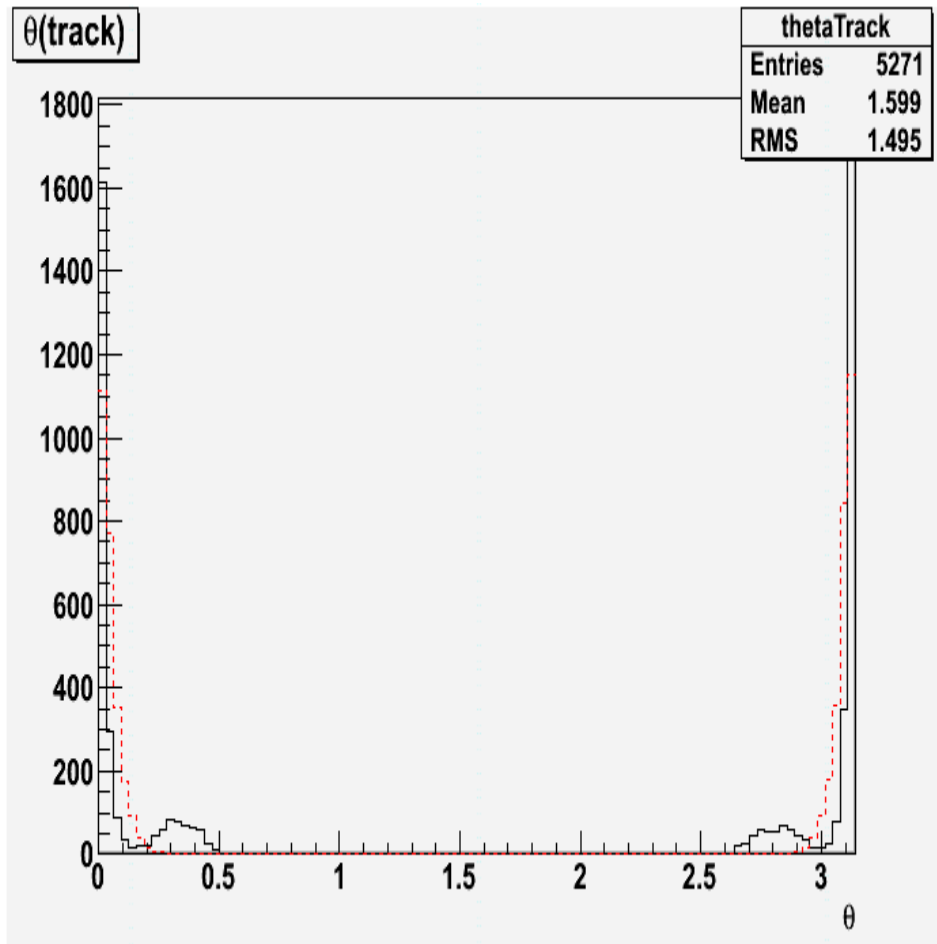
- All the distributions are now closer to MC predictions
- The statistics is much reduced!
- How distributions look like without trigger selection?

Distributions: selection 3

- Sample:
 - Commissioning10-StreamTkAlBeamHalo-v9
- Selection:
 - only runs with ≥ 1000 evts
 - $0 < nTracks < 3$
- Selected tracks: 5271
- See backup for more distributions

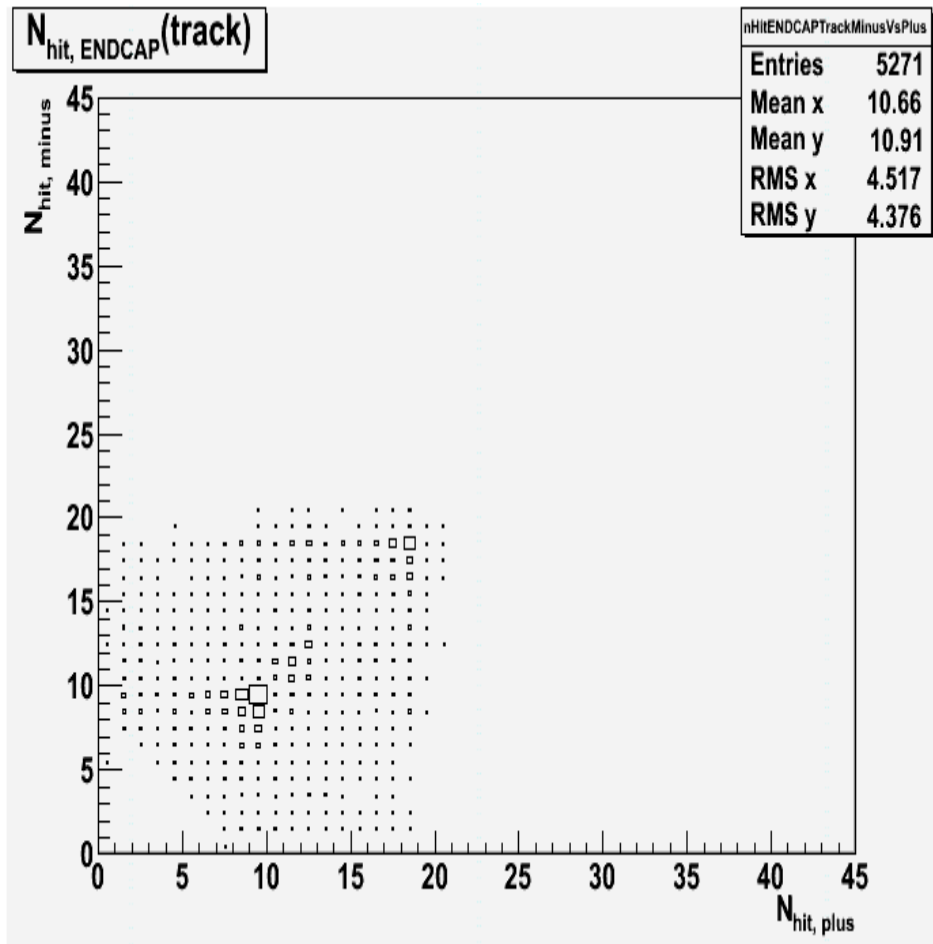
Angular distributions

- Black solid line: data
- Red dashed line: MC

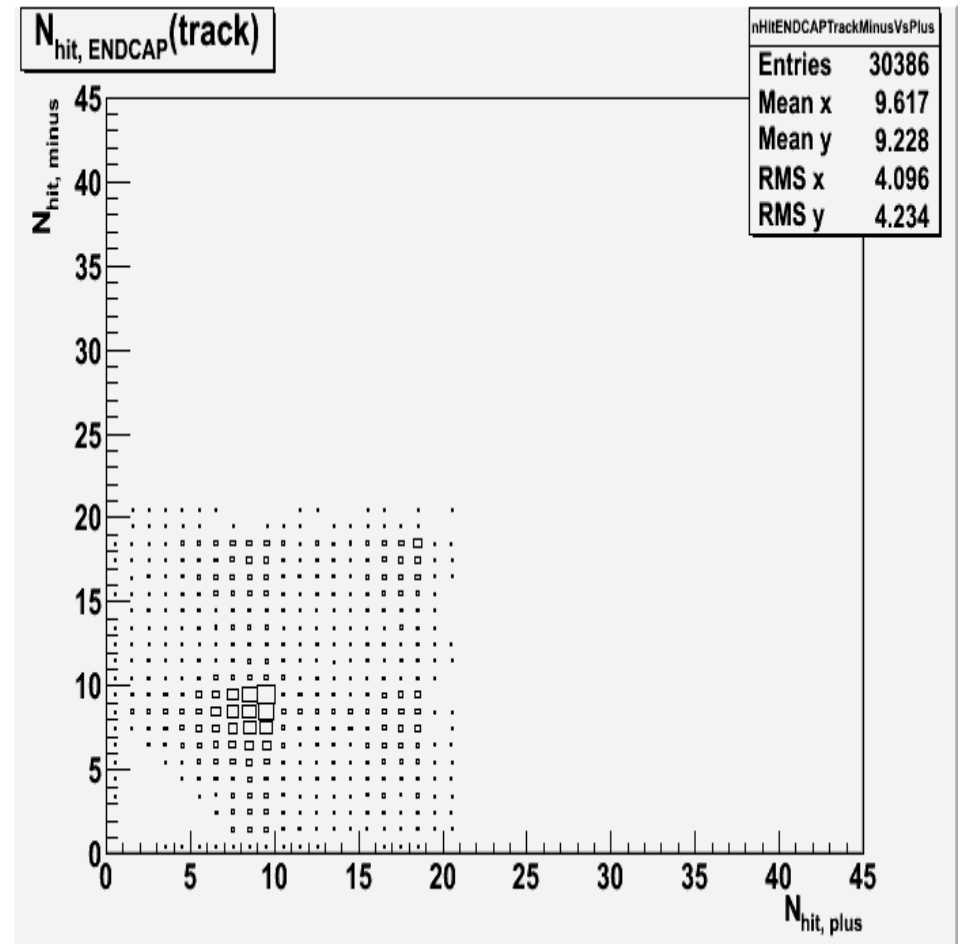


N_hits distributions

- Data:

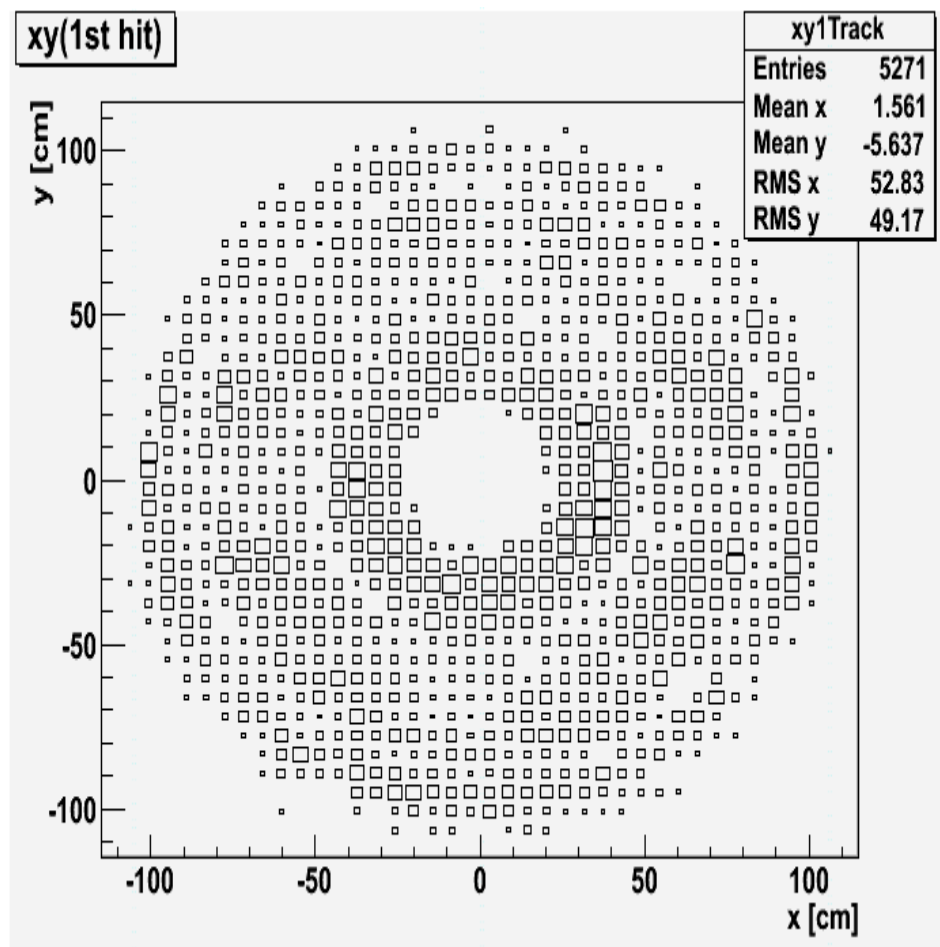


- Monte Carlo:

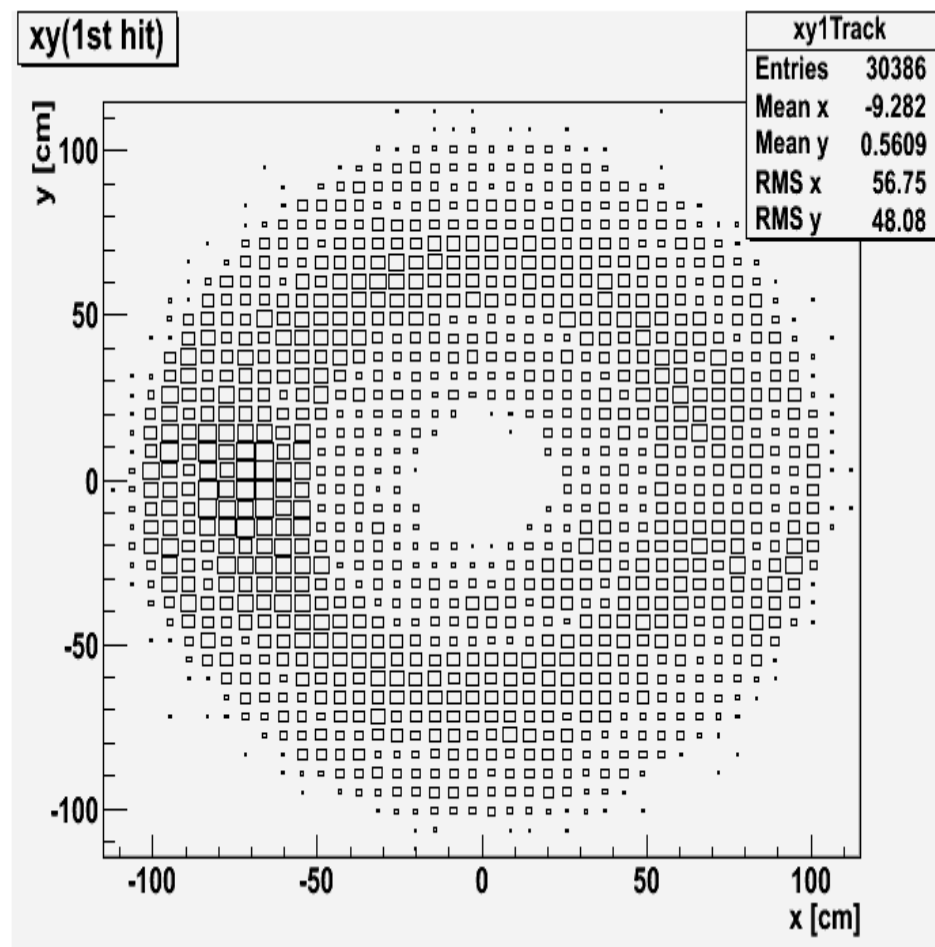


First hit distributions

- Data:

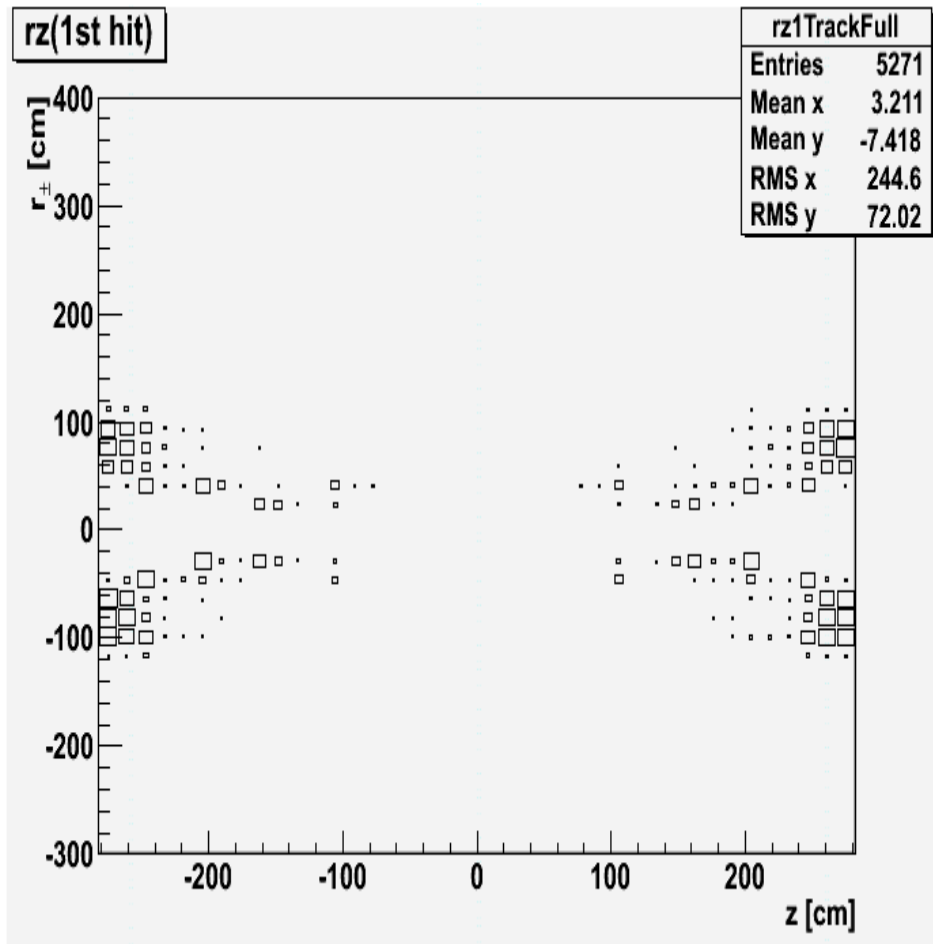


- Monte Carlo:

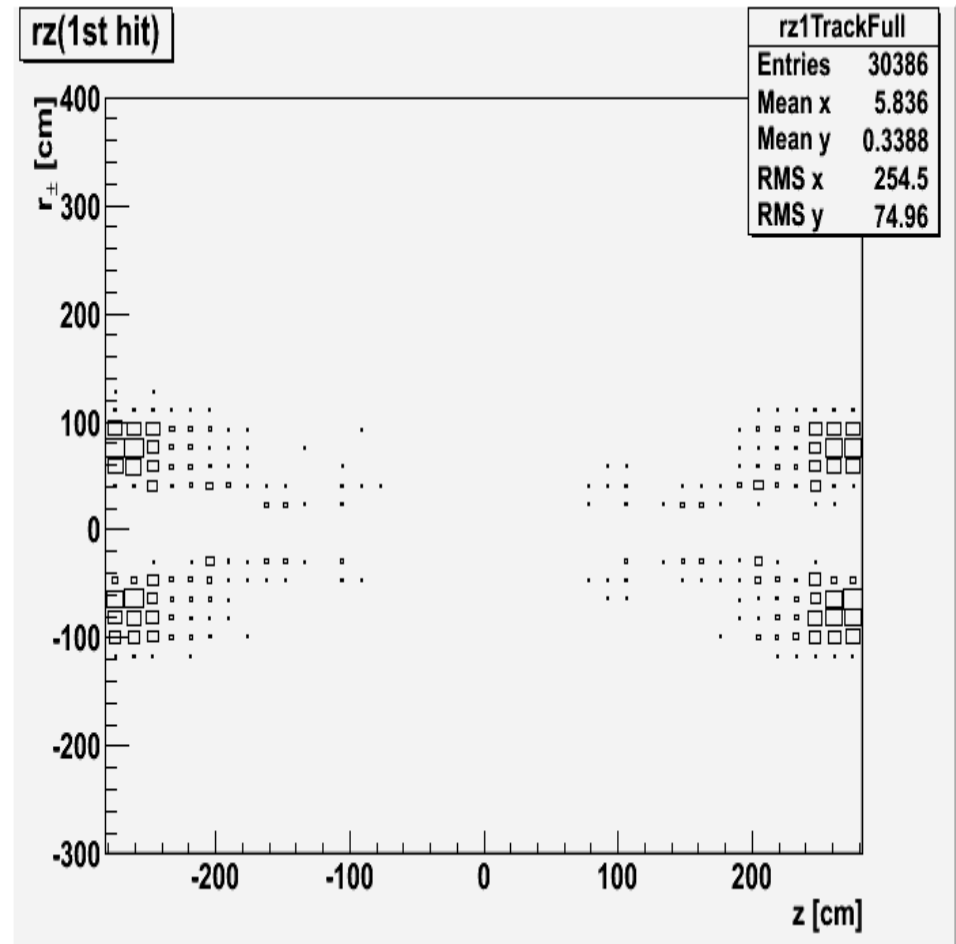


First hit distributions

- Data:



- Monte Carlo:



Comments to selection 3

- The distributions are still similar to selection 2
- The statistics is increased by a factor 2
- Let's analyse the full data sample

Data sample

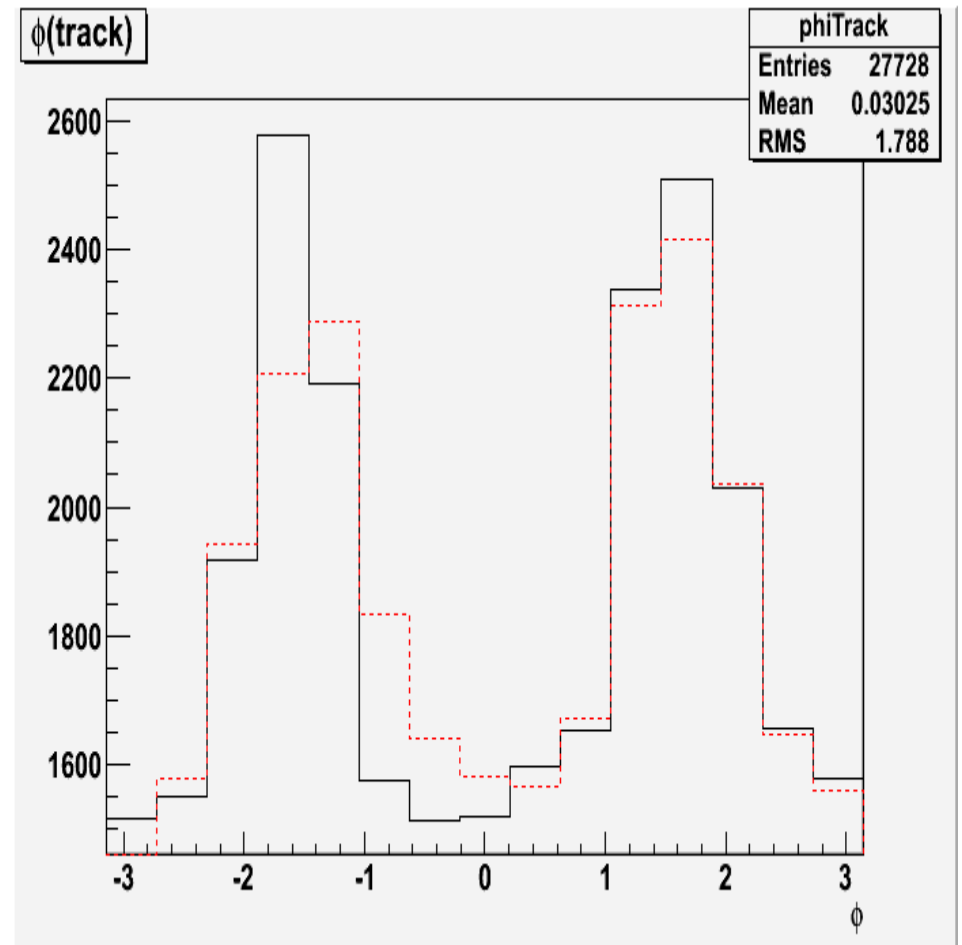
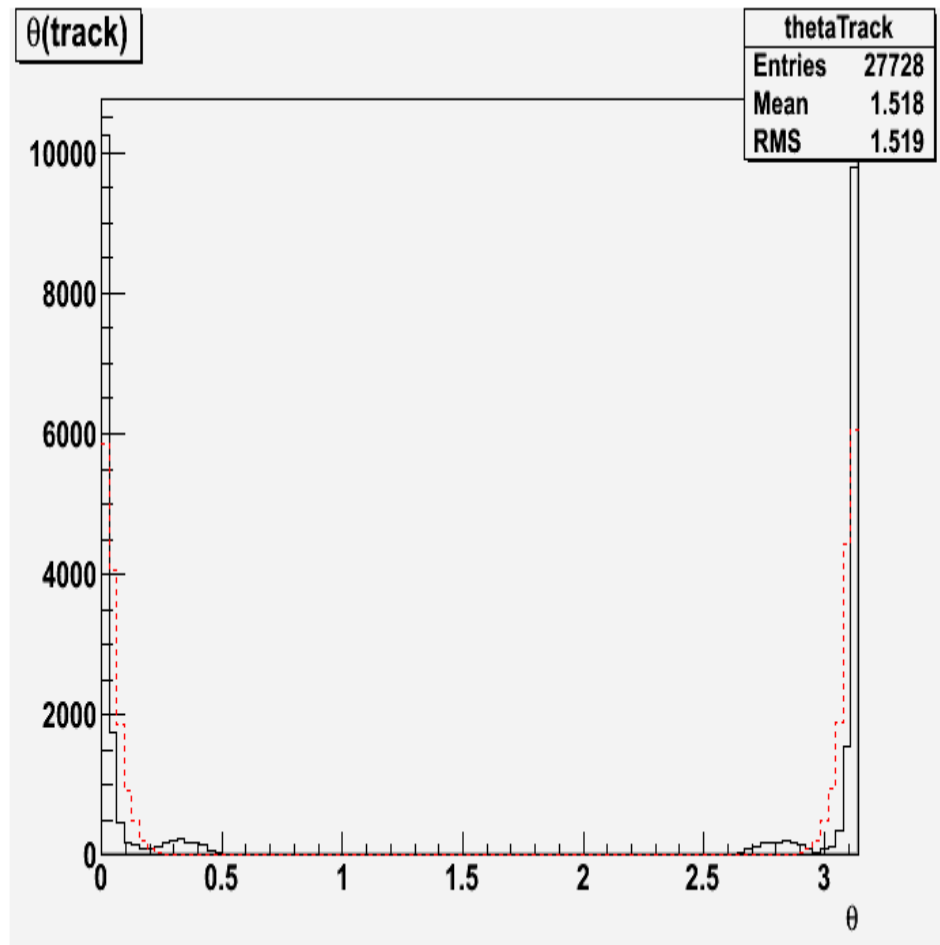
- Datasets:
 - /Cosmics/Commissioning10-StreamTkAlBeamHalo-v8/ALCARECO
 - /Cosmics/Commissioning10-StreamTkAlBeamHalo-v9/ALCARECO
 - /Cosmics/Run2010A-StreamTkAlBeamHalo-v1/ALCARECO
 - /Cosmics/Run2010A-TkAlBeamHalo-v2/ALCARECO
 - /Cosmics/Run2010A-TkAlBeamHalo-v4/ALCARECO
- Run Range: 132514-142189 (01.04.2010-ongoing)
- Number of events: 1419568
 - only runs with > 1000 events have been analyzed
 - $0 < nTracks < 3$
- Selected tracks (usual cuts): 27728

Number of selected tracks

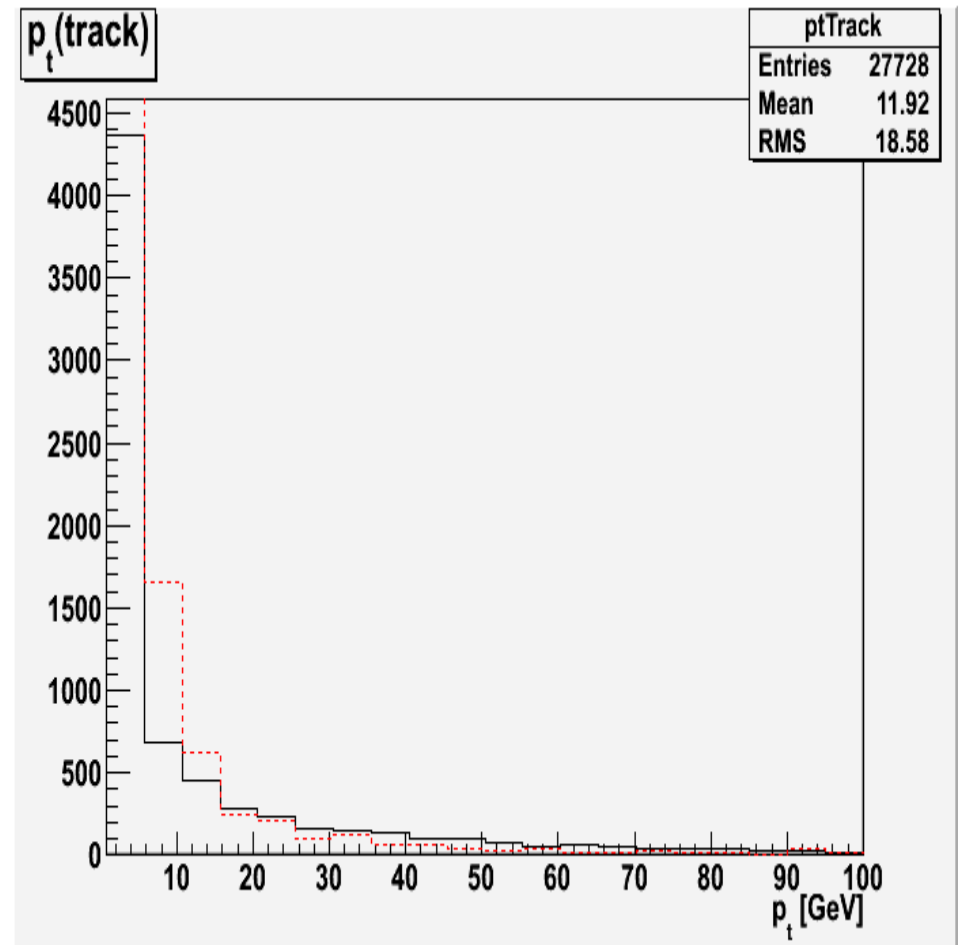
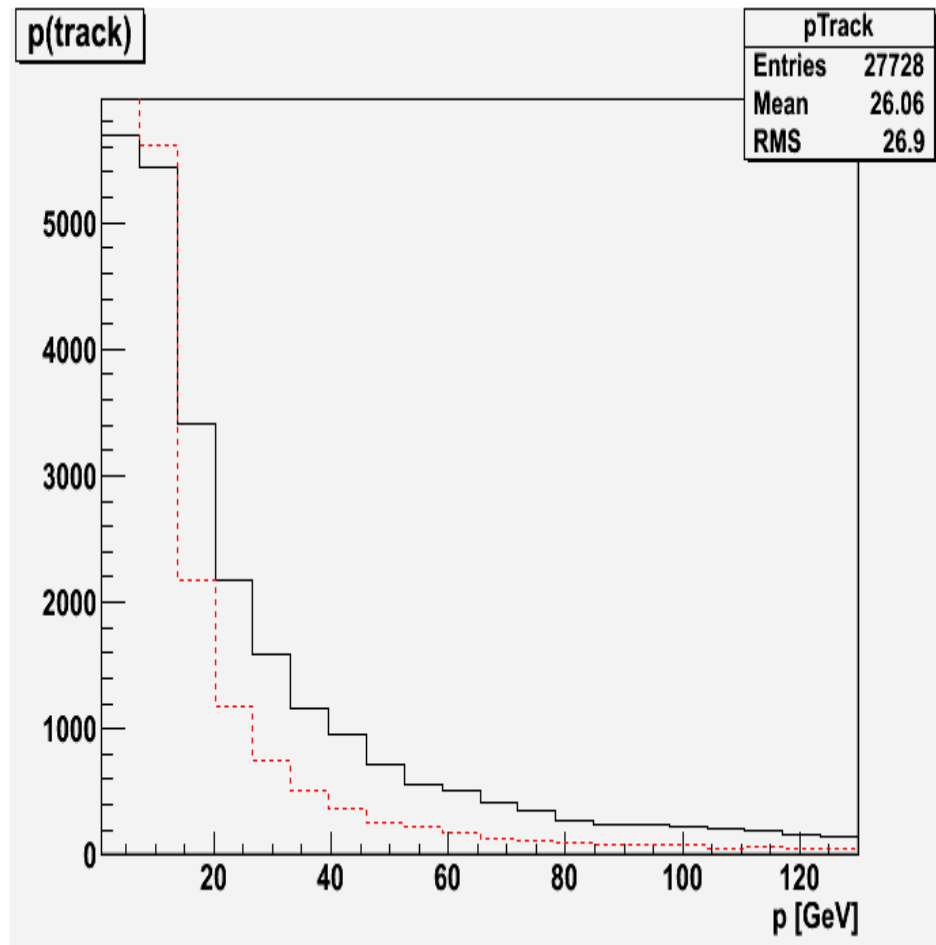
Sample	Events	Tracks
Commissioning10-StreamTkAlBeamHalo-v8	78464	1064
Commissioning10-StreamTkAlBeamHalo-v9	183830	5271
Run2010A-StreamTkAlBeamHalo-v1	11174	666
Run2010A-TkAlBeamHalo-v2	46995	810
Run2010A-TkAlBeamHalo-v4	608489	19917
TOTAL DATA	928952	27728

Angular distributions

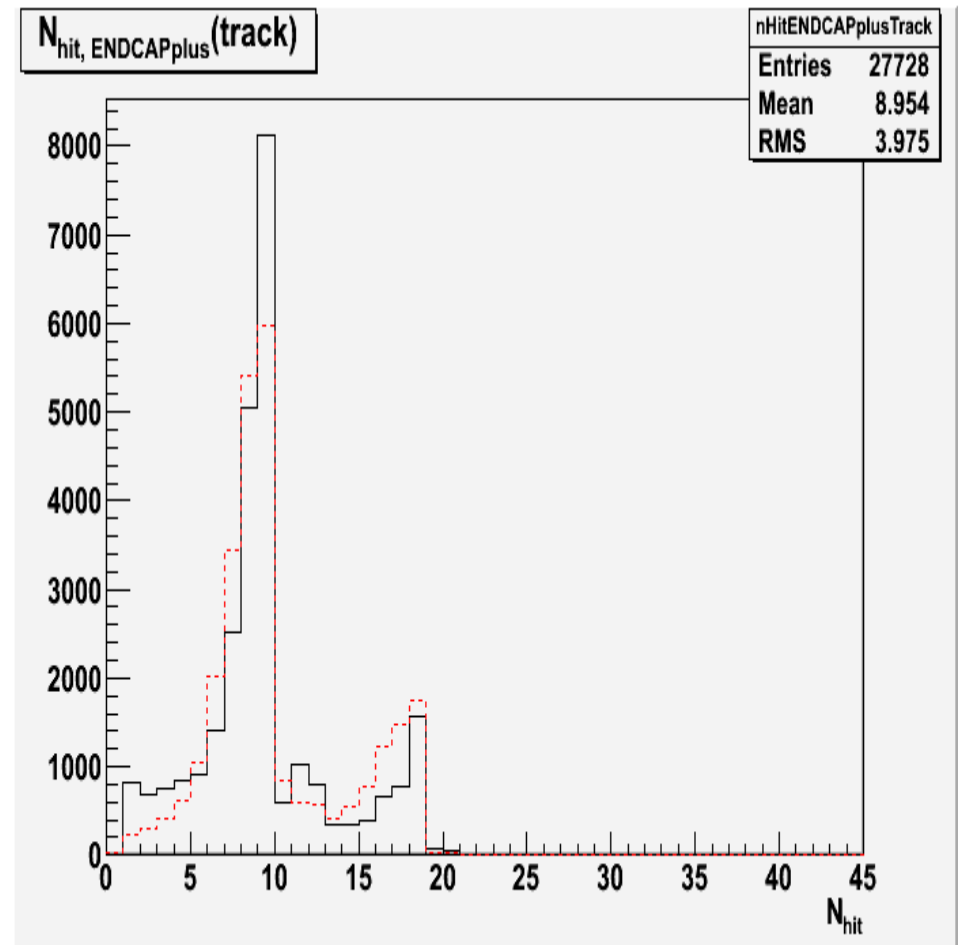
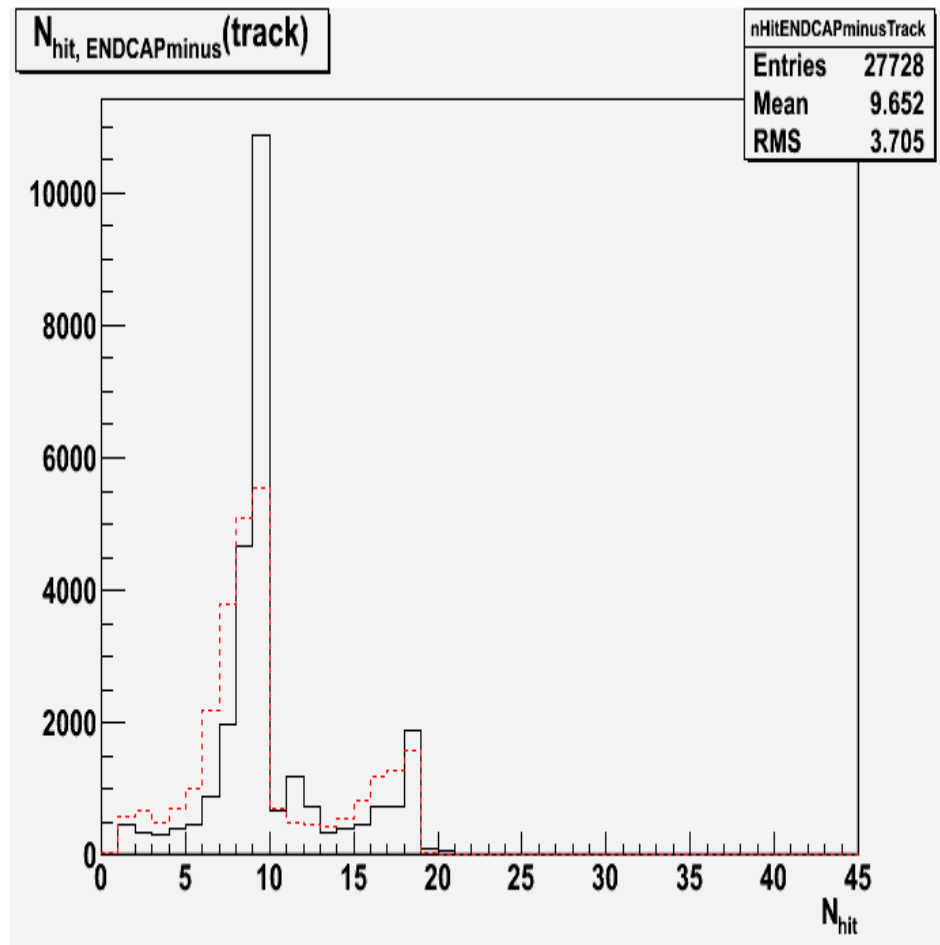
- Black solid line: data
- Red dashed line: MC



Momenta distributions

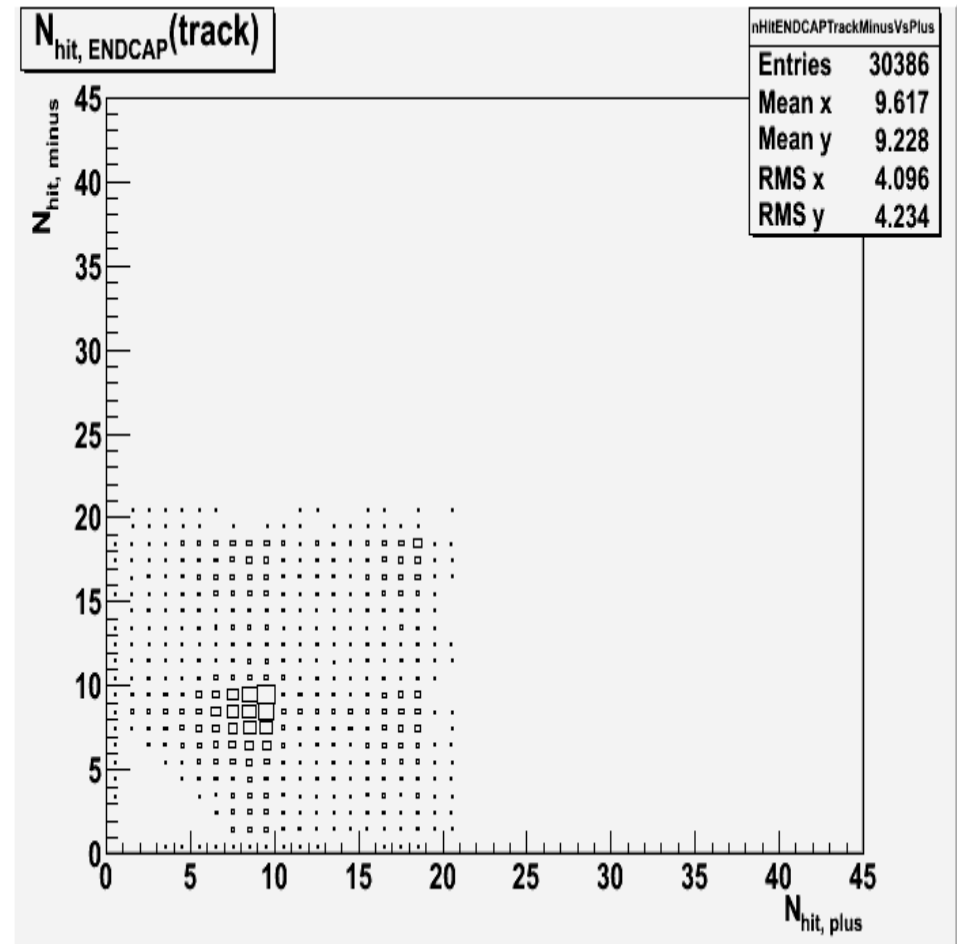
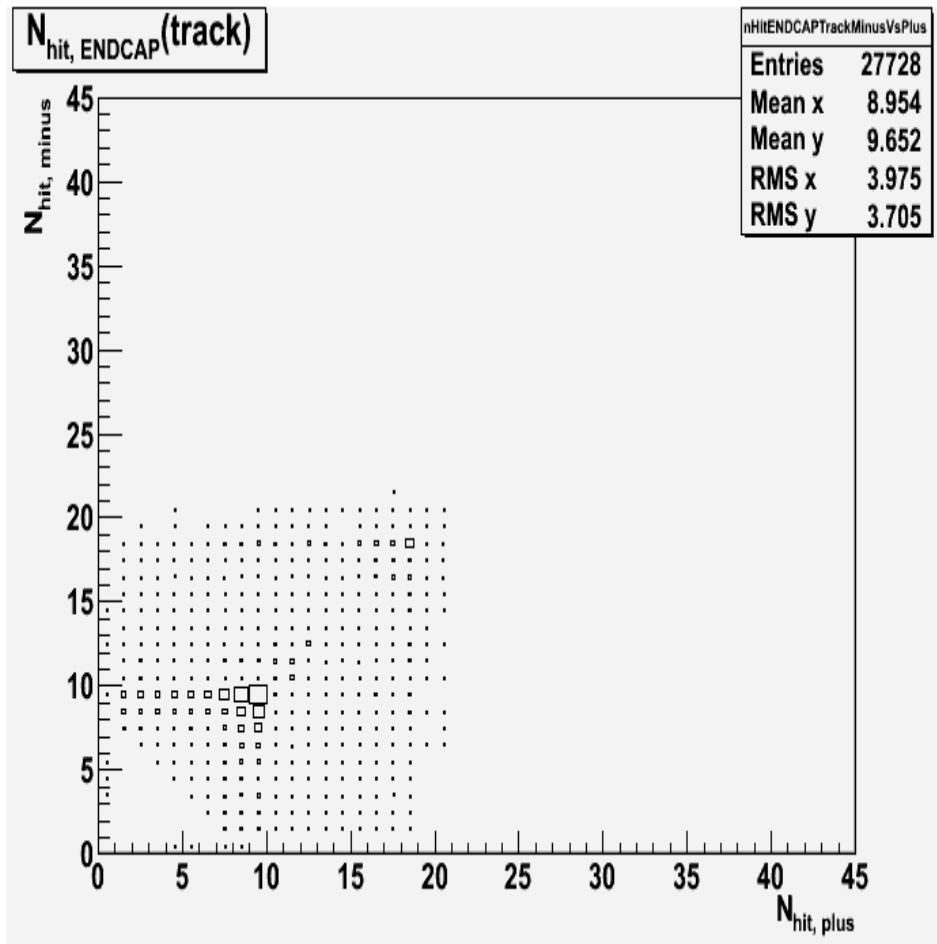


N_hits distributions



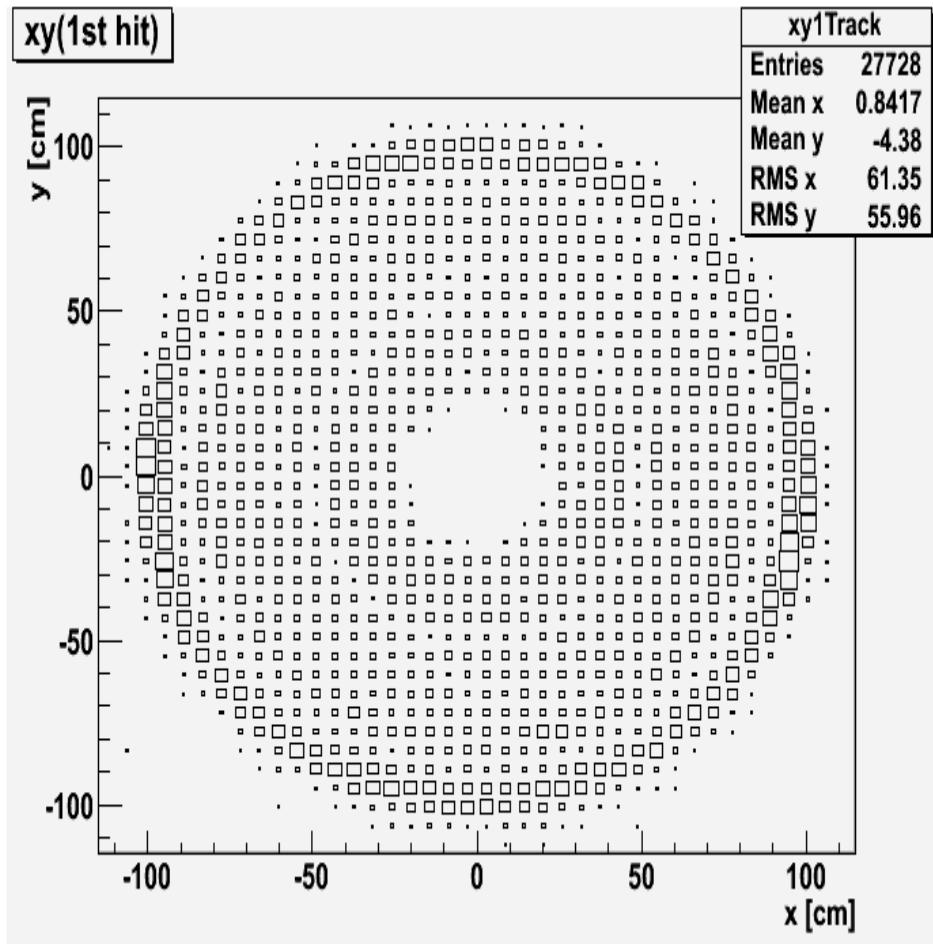
N_hits distributions

- Data:
- Monte Carlo:

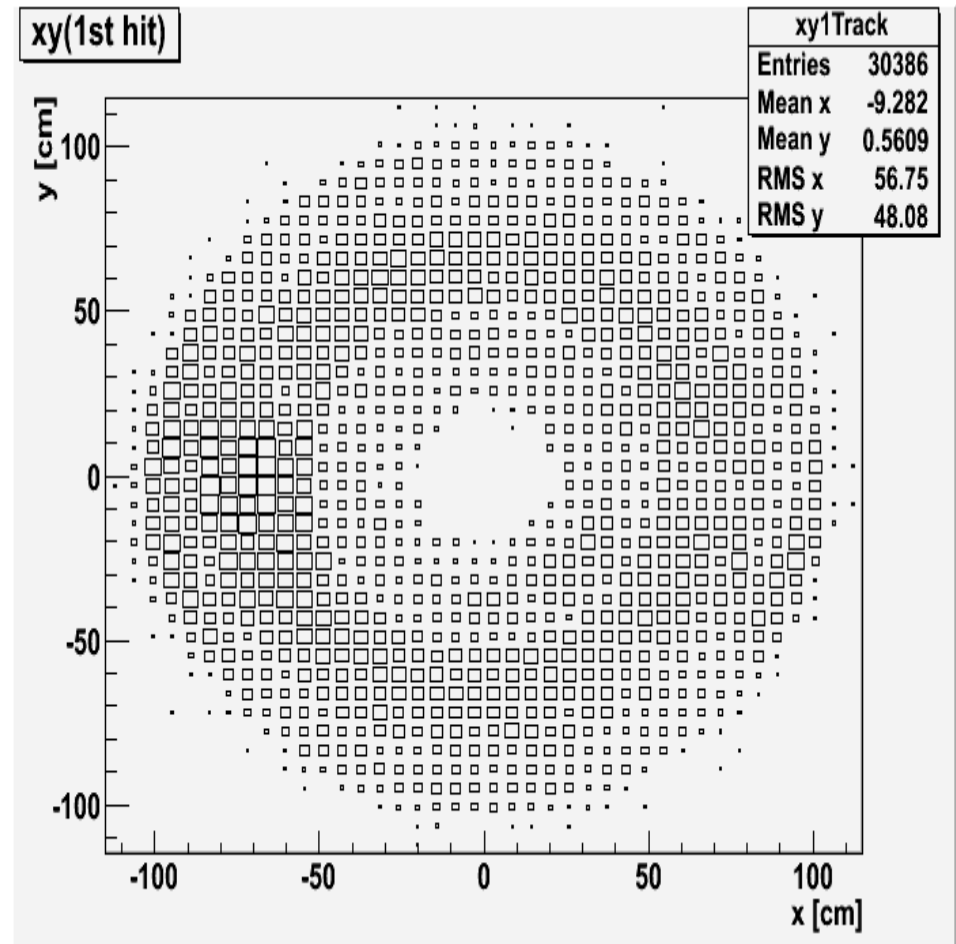


First hit distributions

- Data:

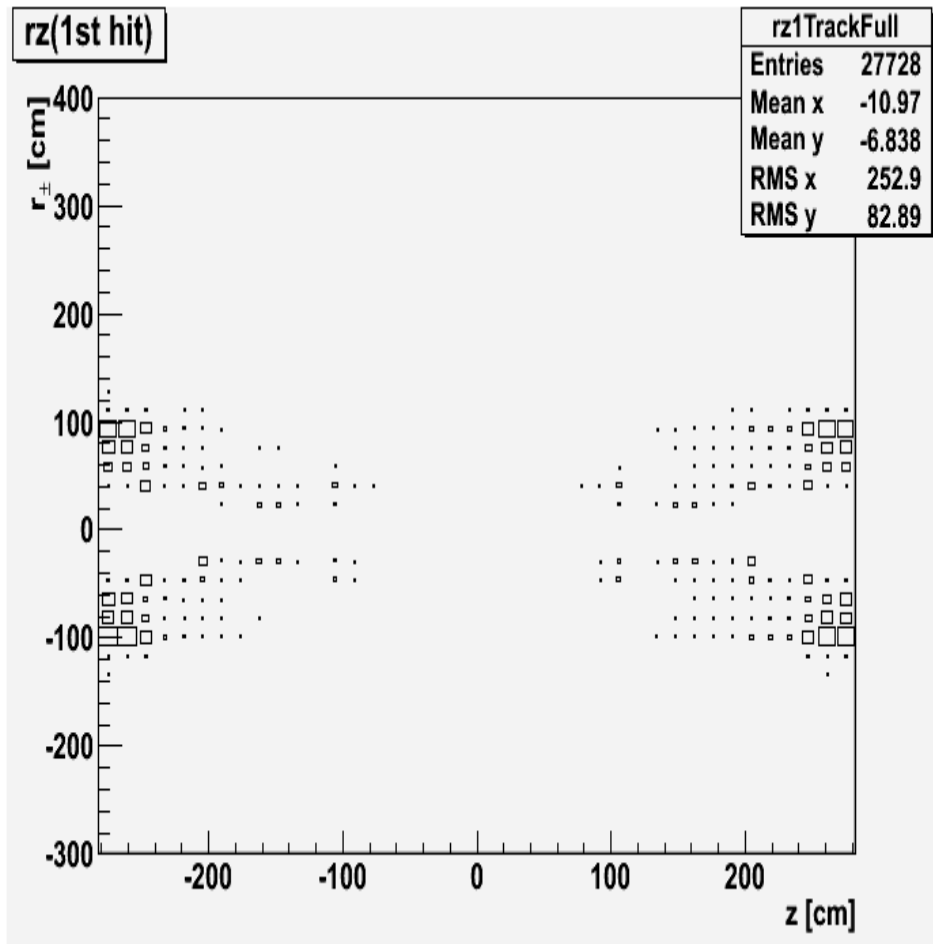


- Monte Carlo:

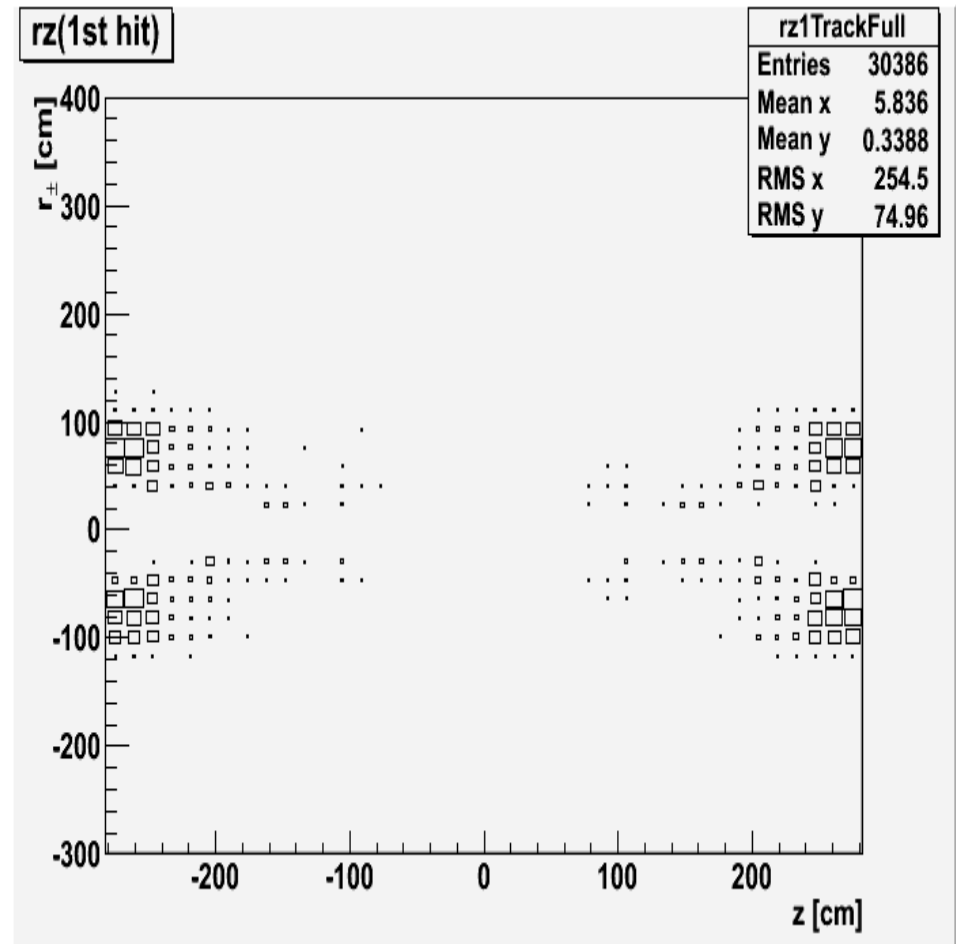


First hit distributions

- Data:



- Monte Carlo:



Conclusions

- Events in the data sets look mostly like hadronic or gamma background.
- After event selection:
 - clean track sample, but small statistics;
 - only a small fraction of events are selected also by the trigger (to be checked);
 - still some differences between data and MC, but now the distribution are described much better.

To do

- Check fraction of tracks rejected by the refitter
- Check bit trigger distribution (Backward-Foward asymmetry in some data sets)
- Check distribution of nTracks (and possibly soften the cut)
- Check $\sigma(p)/p$ for selected tracks
- Refine track selection (# missing hits, (nHitPlus-nHitMinus), increase pMin cut)

Backup Slides

Number of selected tracks

Sample	Events (*)	Tracks
Commissioning10-StreamTkAlBeamHalo-v9:		
all runs	373145	--
1) runs w/ ≥ 1000 evts, Trg. selection	365788	32345
2) runs w/ ≥ 1000 evts, Trg. sel., $0 < nTrk < 3$	183830	2571
3) runs w/ ≥ 1000 evts, $0 < nTrk < 3$	183830	5271
Monte Carlo	100000	30386

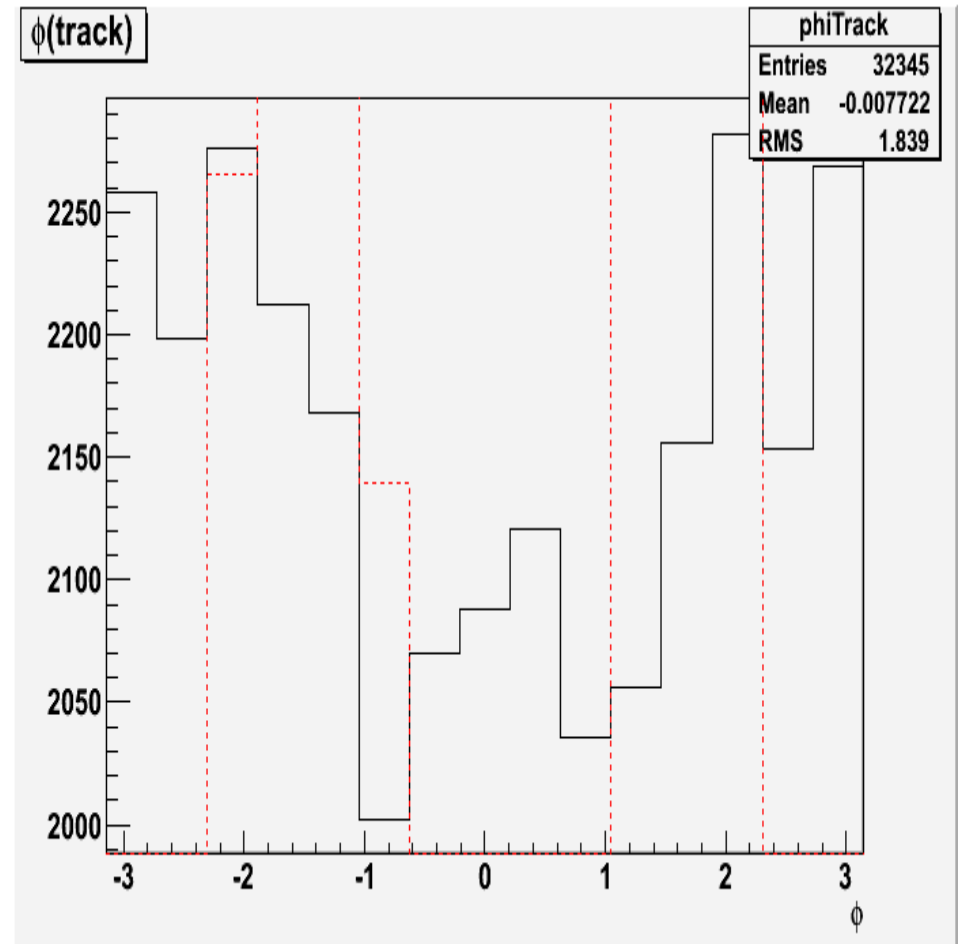
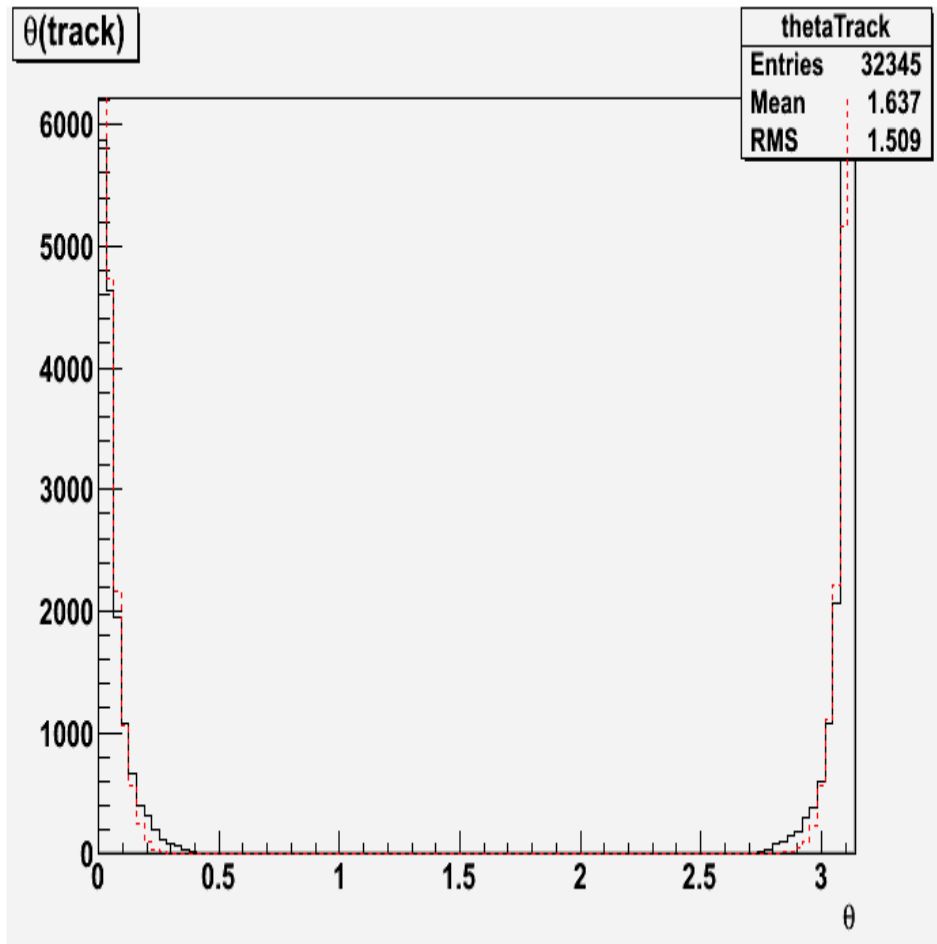
(*) before trigger selection

Distributions: selection 1

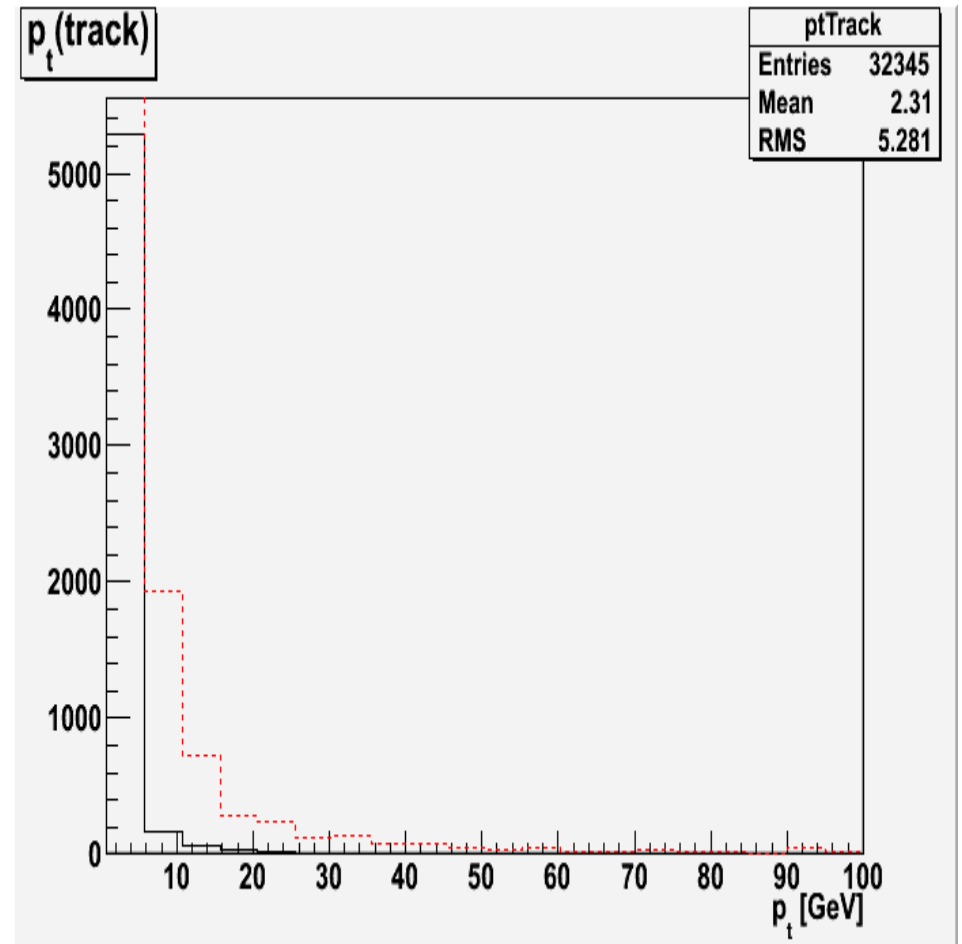
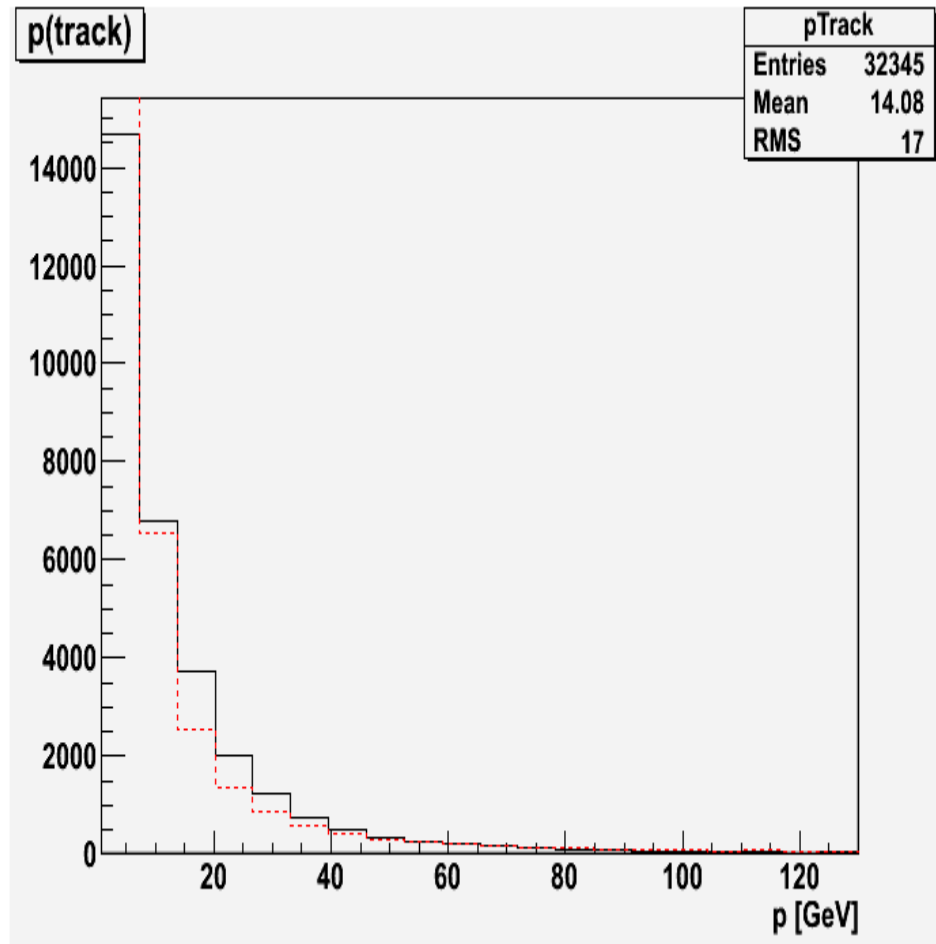
- Sample:
 - Commissioning10-StreamTkAlBeamHalo-v9
- Selection:
 - only runs with ≥ 1000 evts
 - Trg. selection: bit 36 || 37 || 38 || 39

Angular distributions

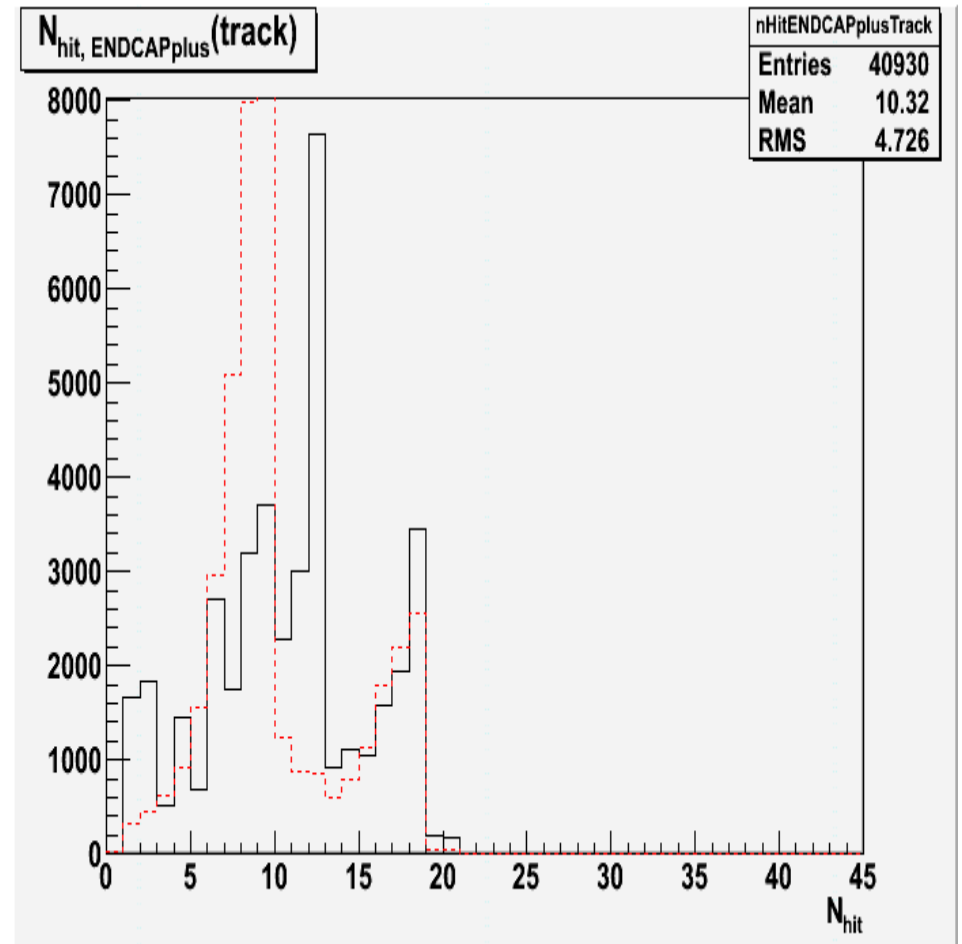
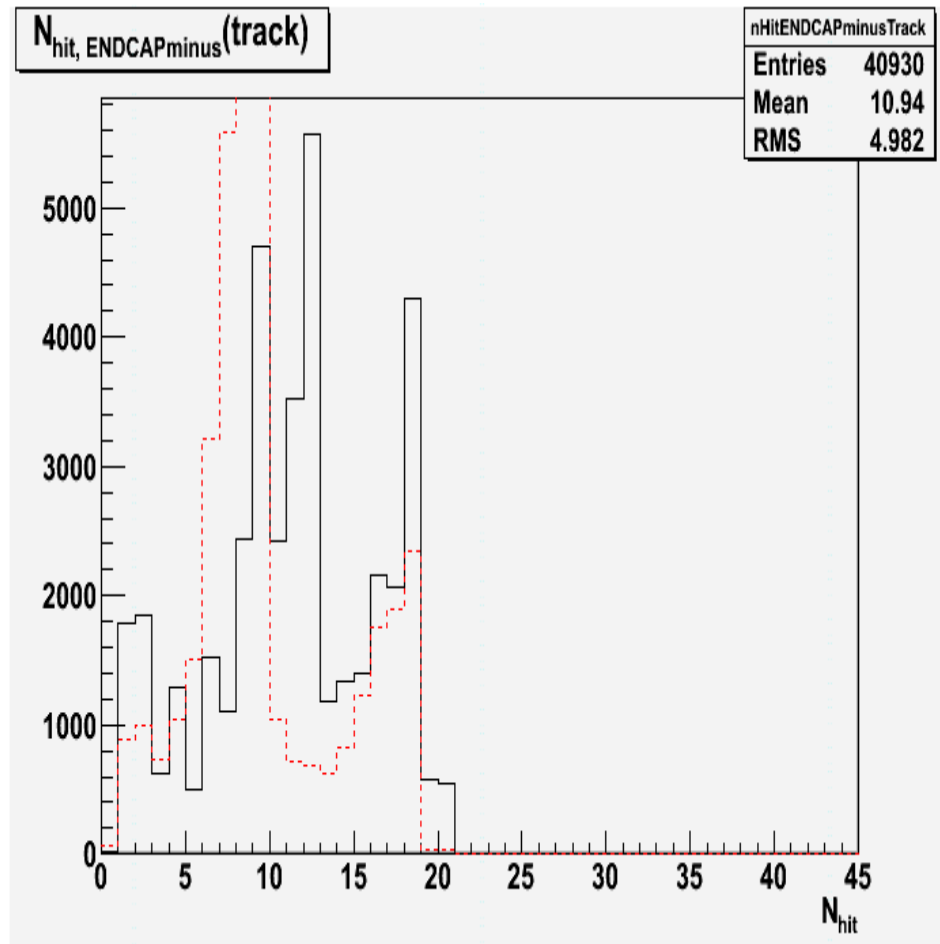
- Black solid line: data
- Red dashed line: MC



Momenta distributions

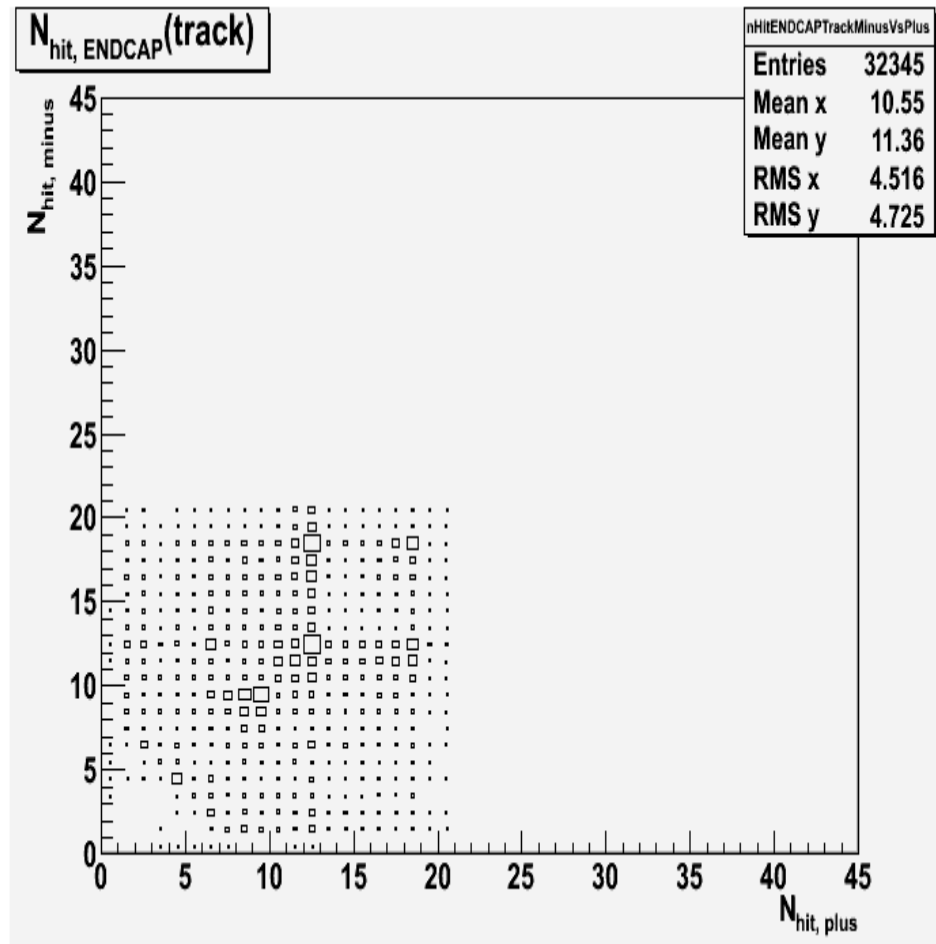


N_hits distributions

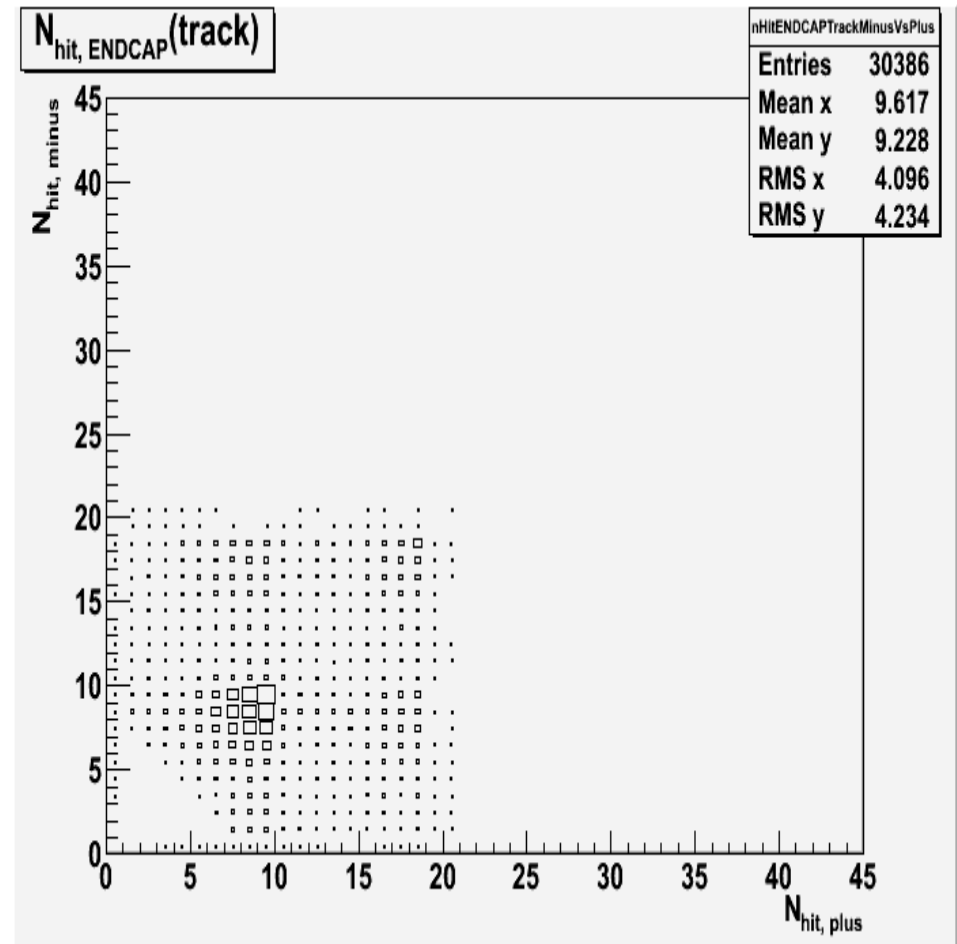


N_hits distributions

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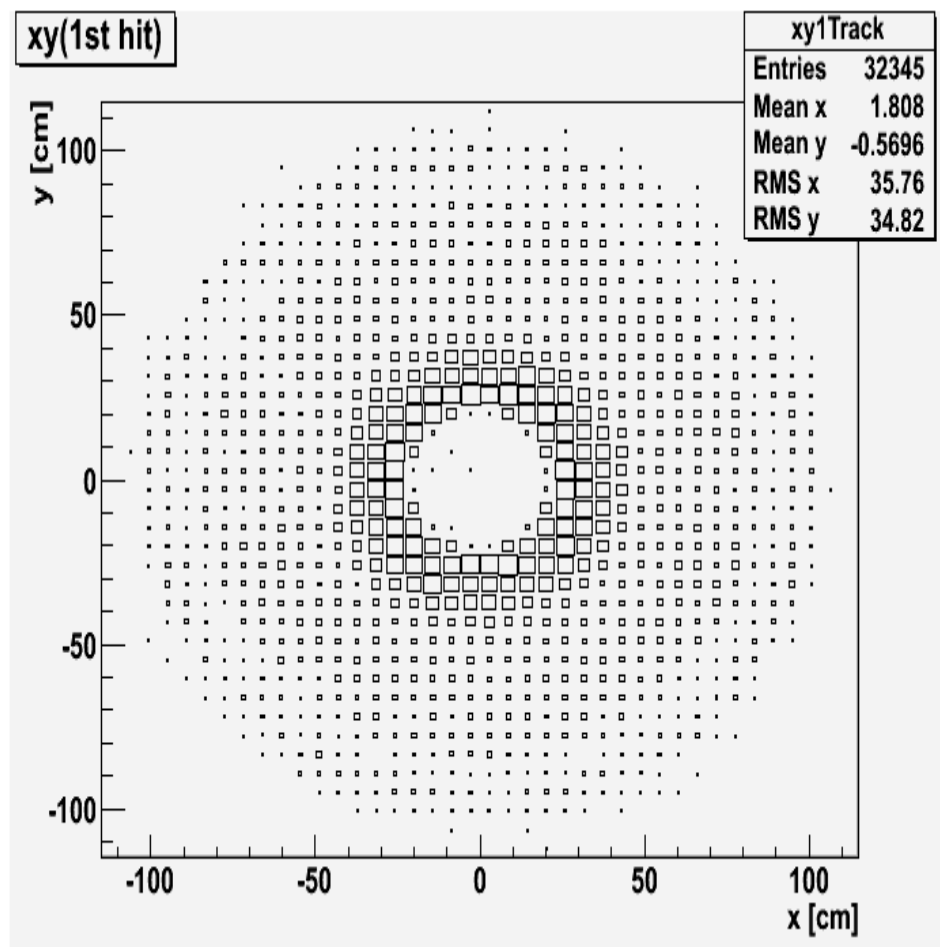


- Monte Carlo:

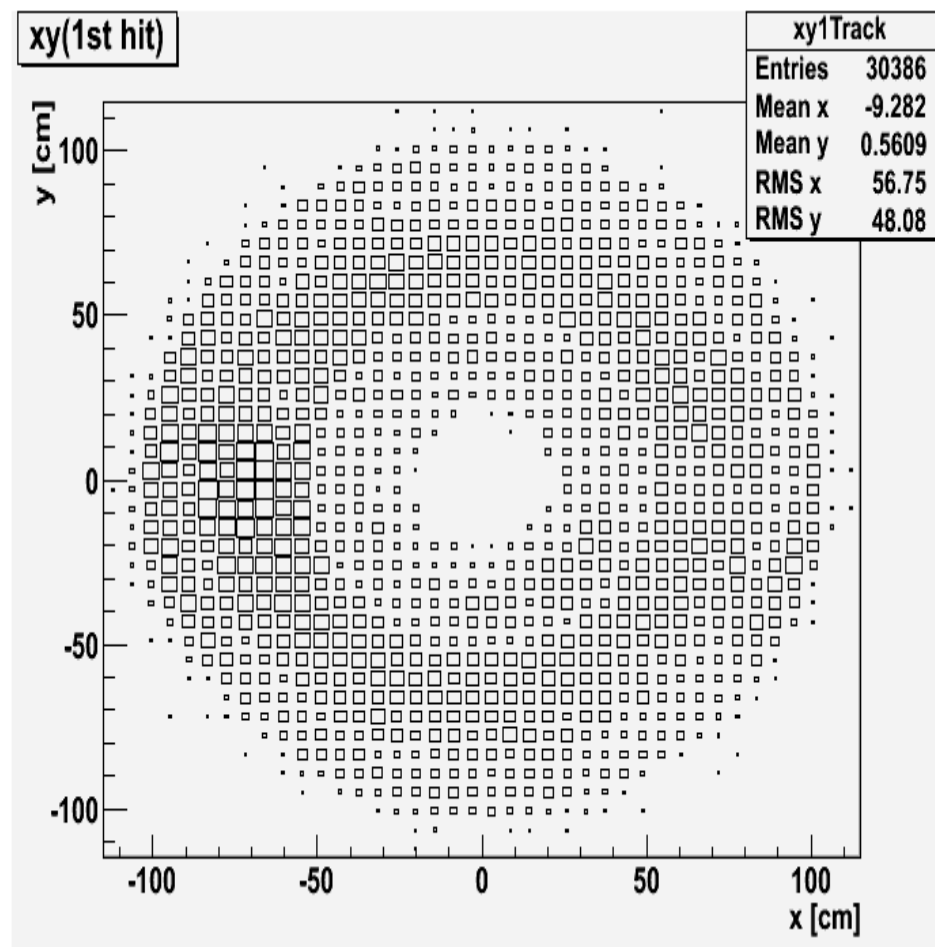


First hit distributions

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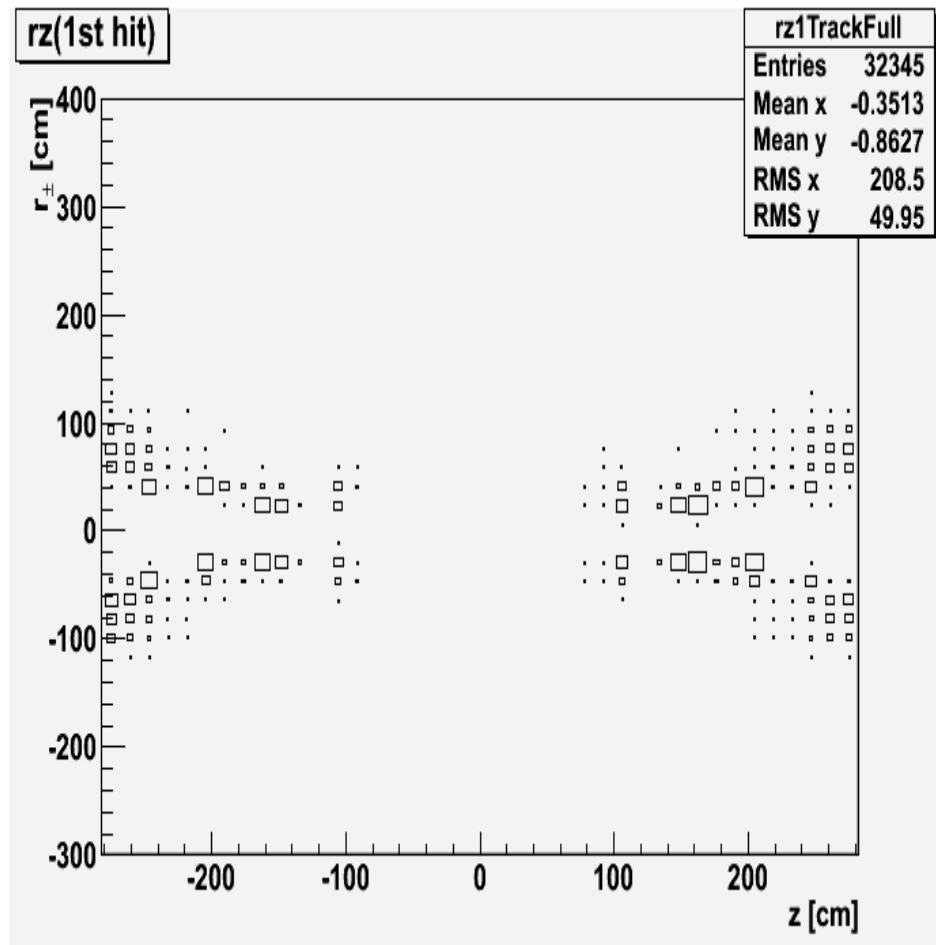


- Monte Carlo:

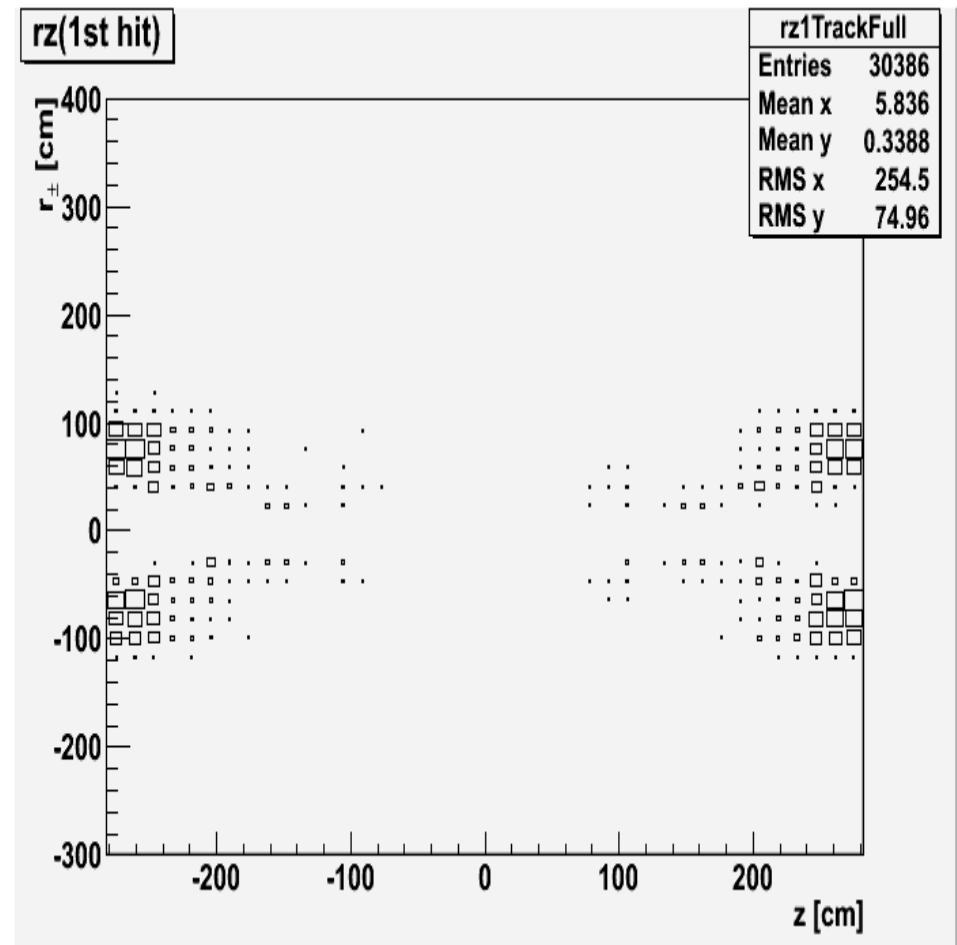


First hit distributions

- Data:



- Monte Carlo:

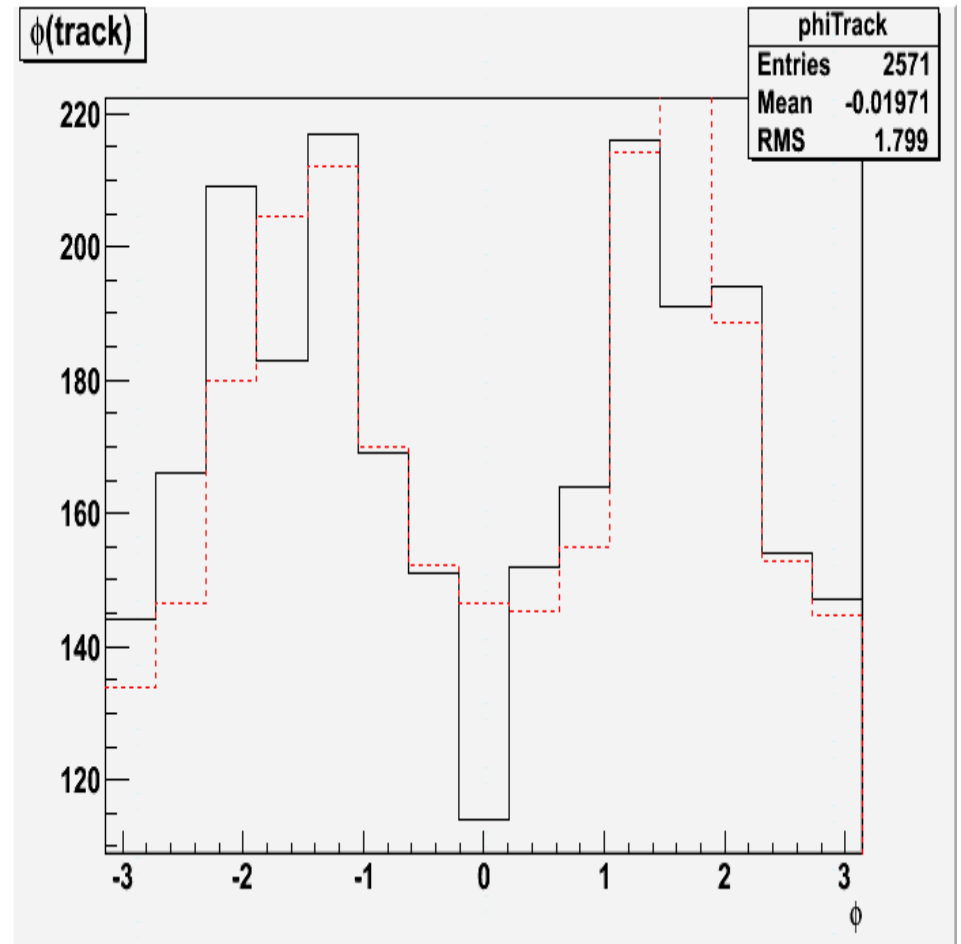
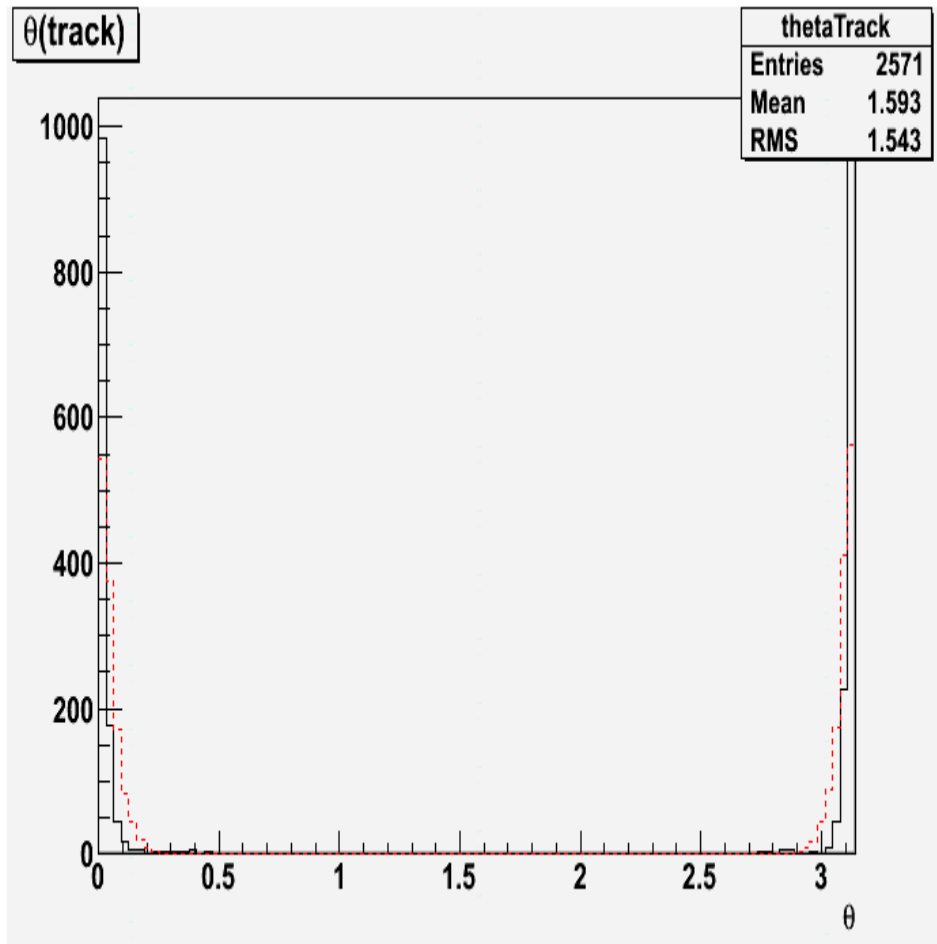


Distributions: selection 2

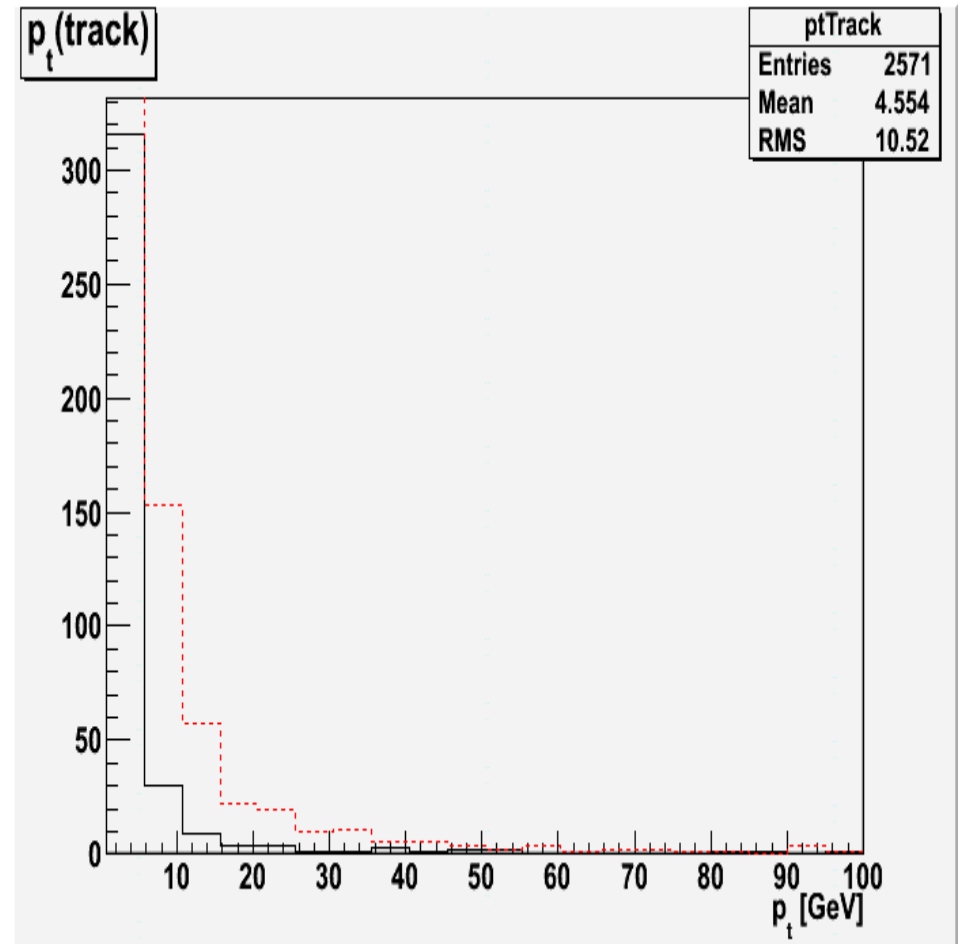
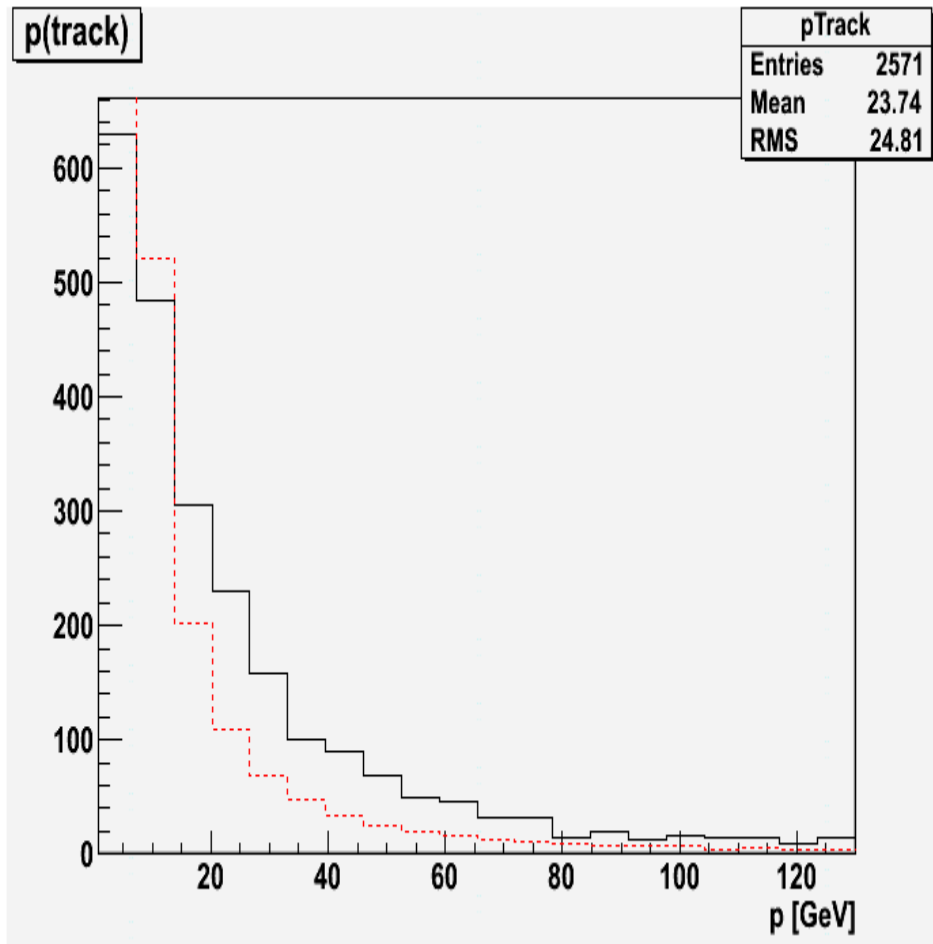
- Sample:
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- Selection:
 - only runs with ≥ 1000 evts
 - $0 < nTracks < 3$
 - Trg. selection: bit 36 || 37 || 38 || 39

Angular distributions

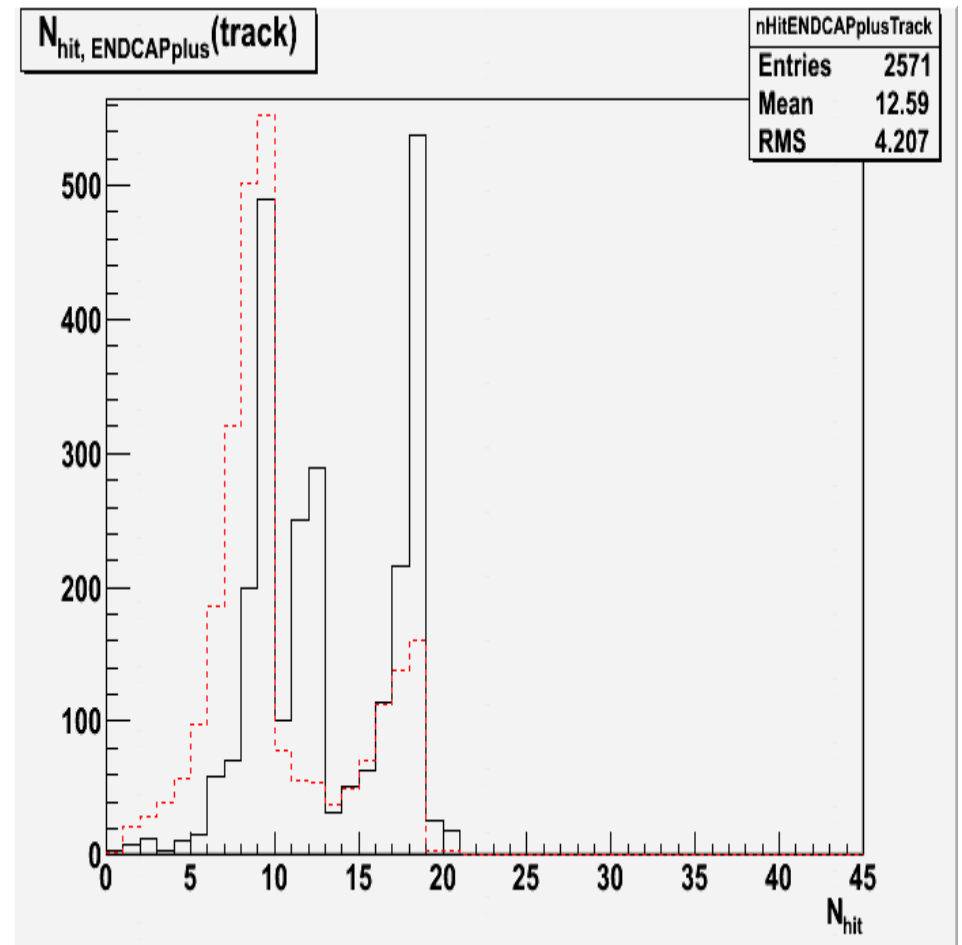
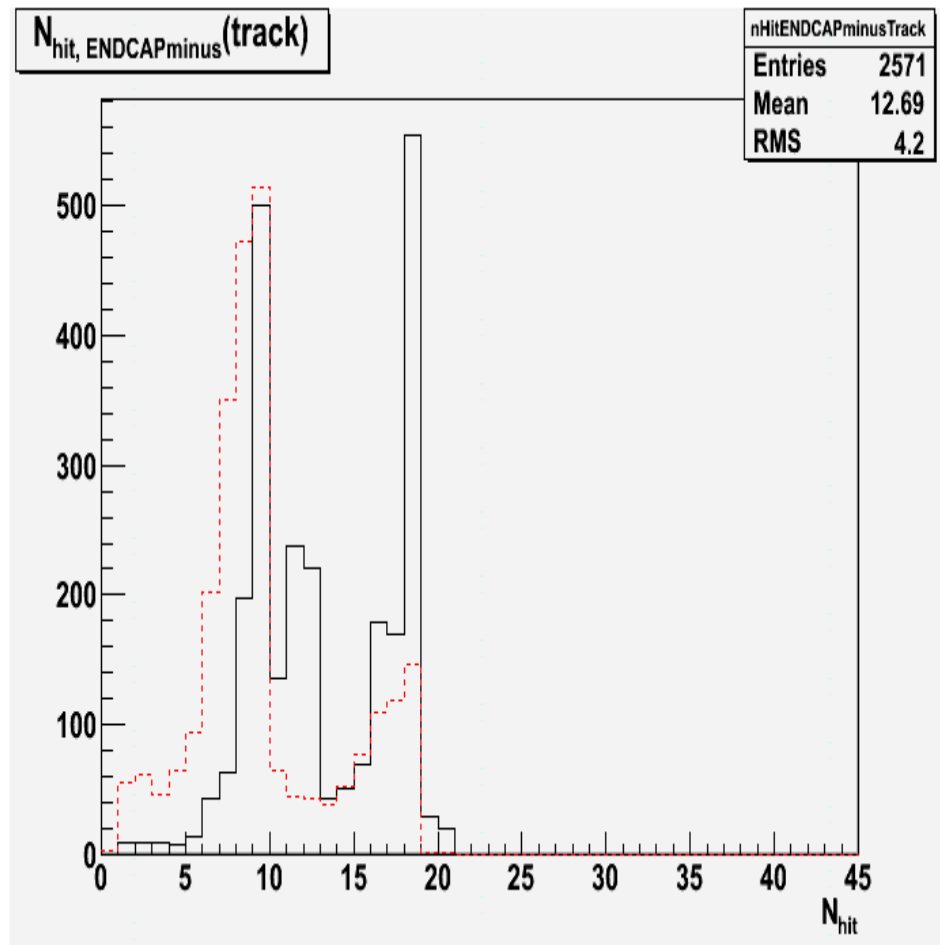
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- Red dashed line: MC



Momenta distributions

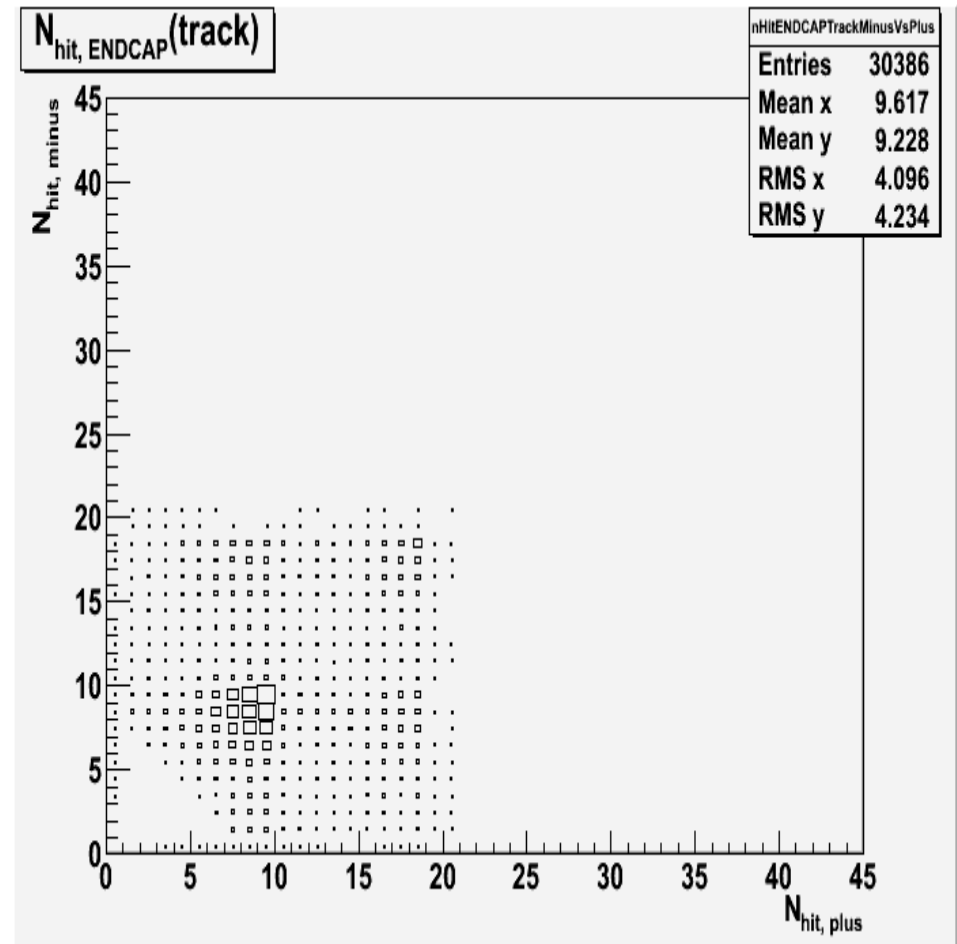
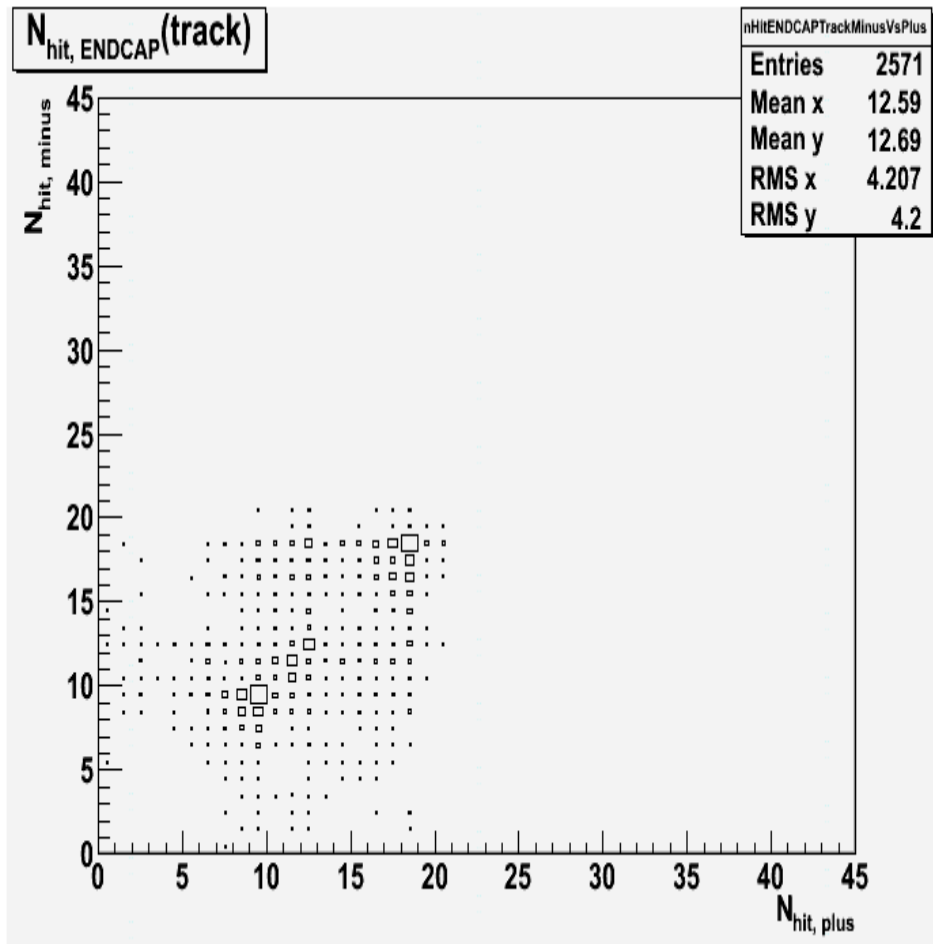


N_hits distributions



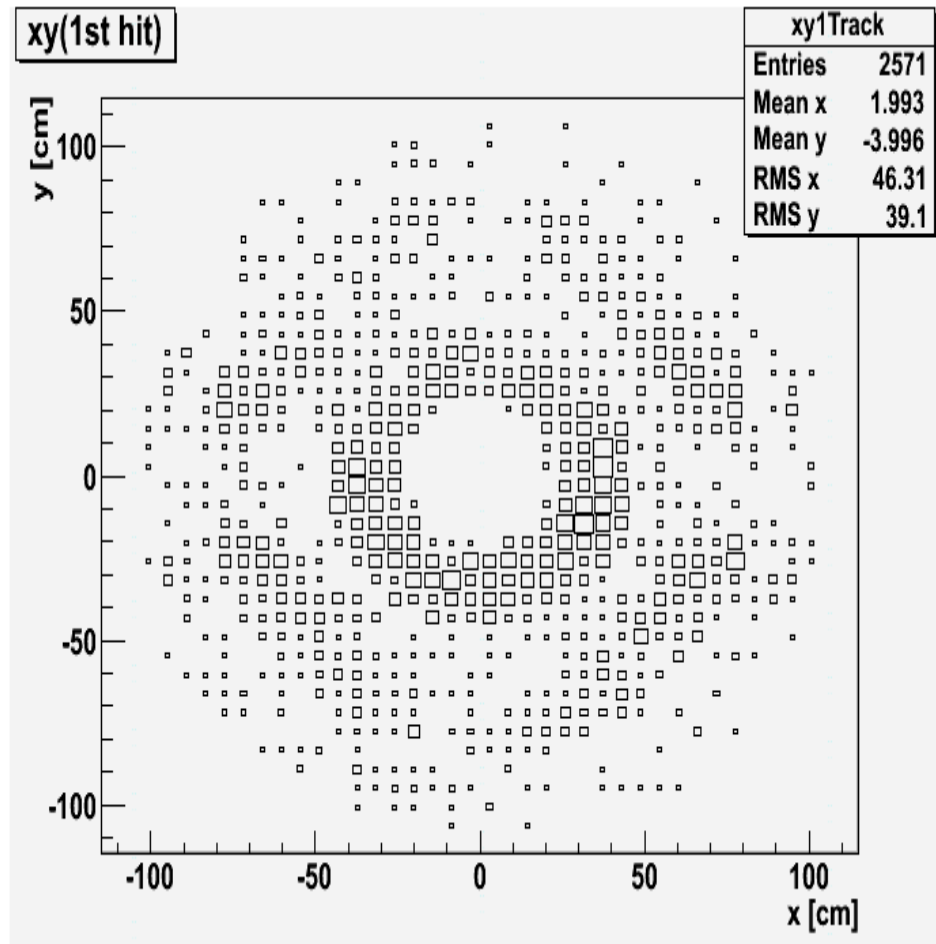
N_hits distributions

- Data:
- Monte Carlo:

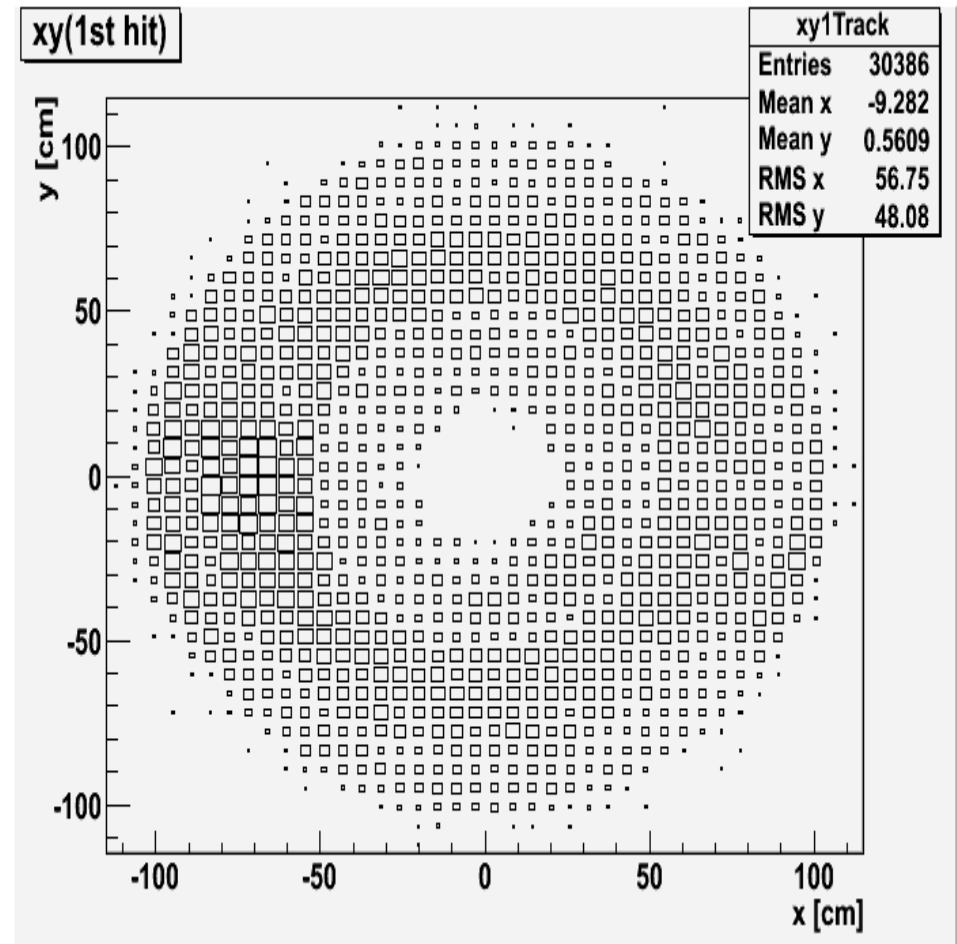


First hit distributions

- Data:

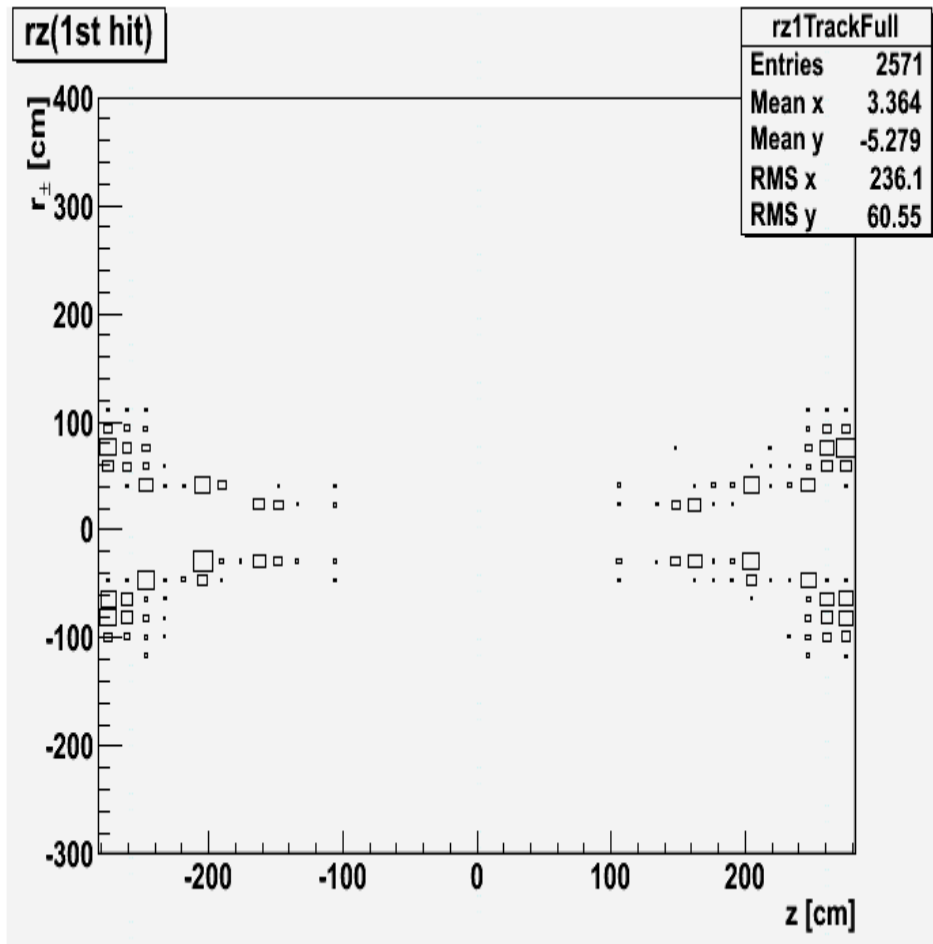


- Monte Carlo:

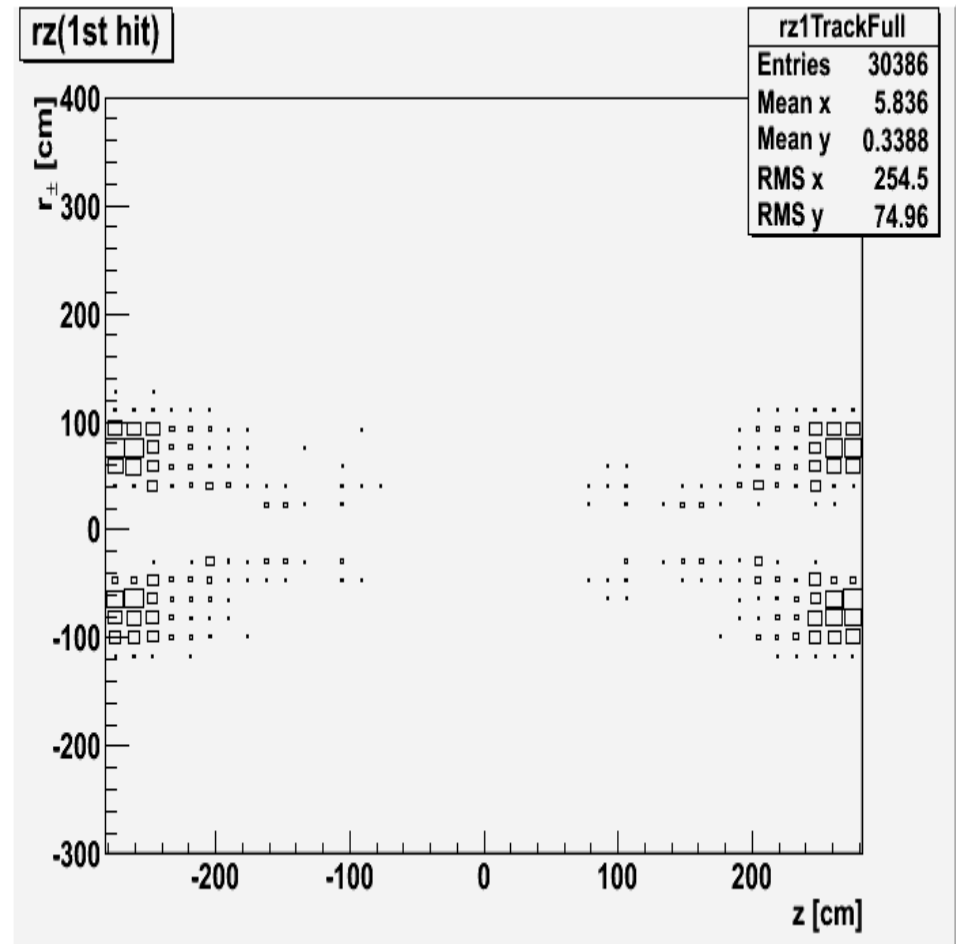


First hit distributions

- Data:



- Monte Carlo:

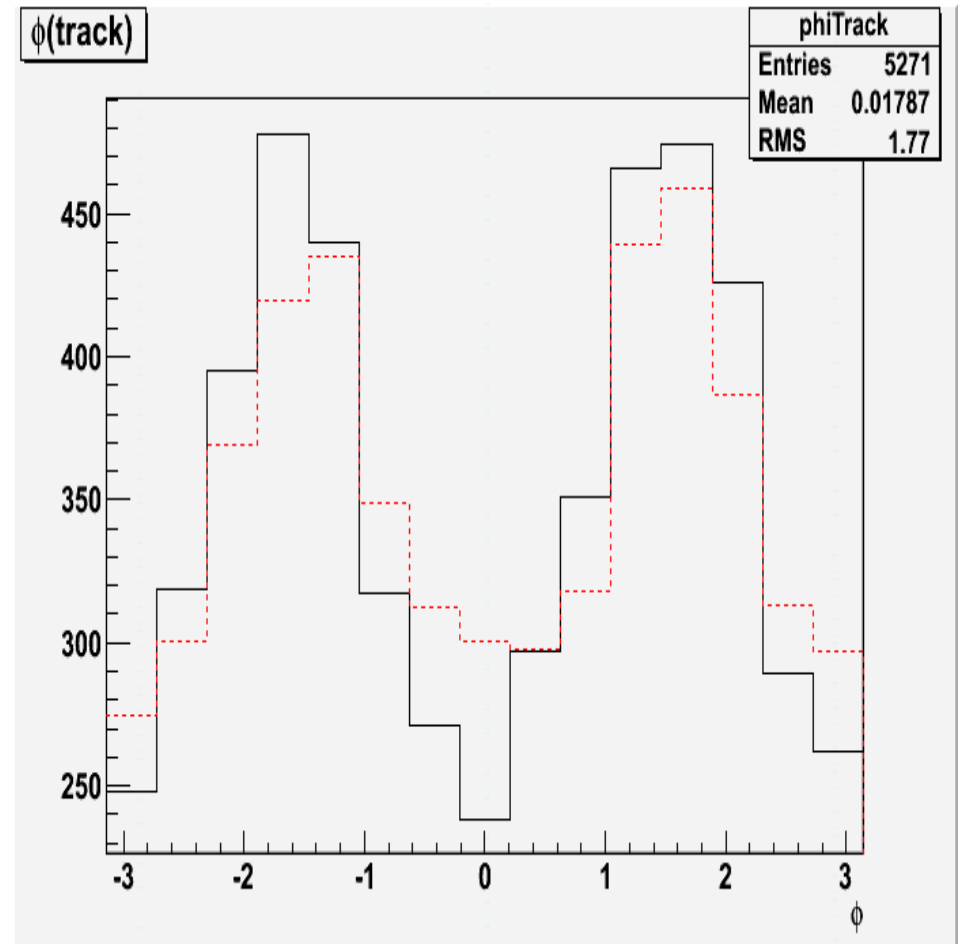
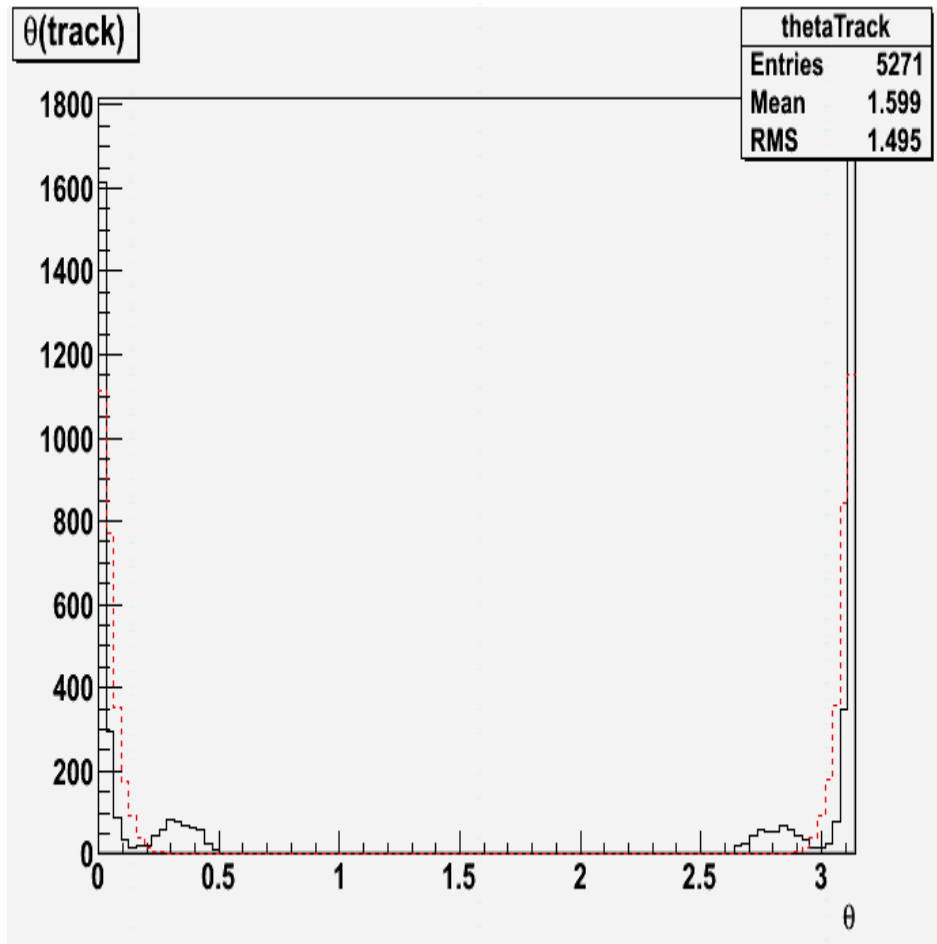


Distributions: selection 3

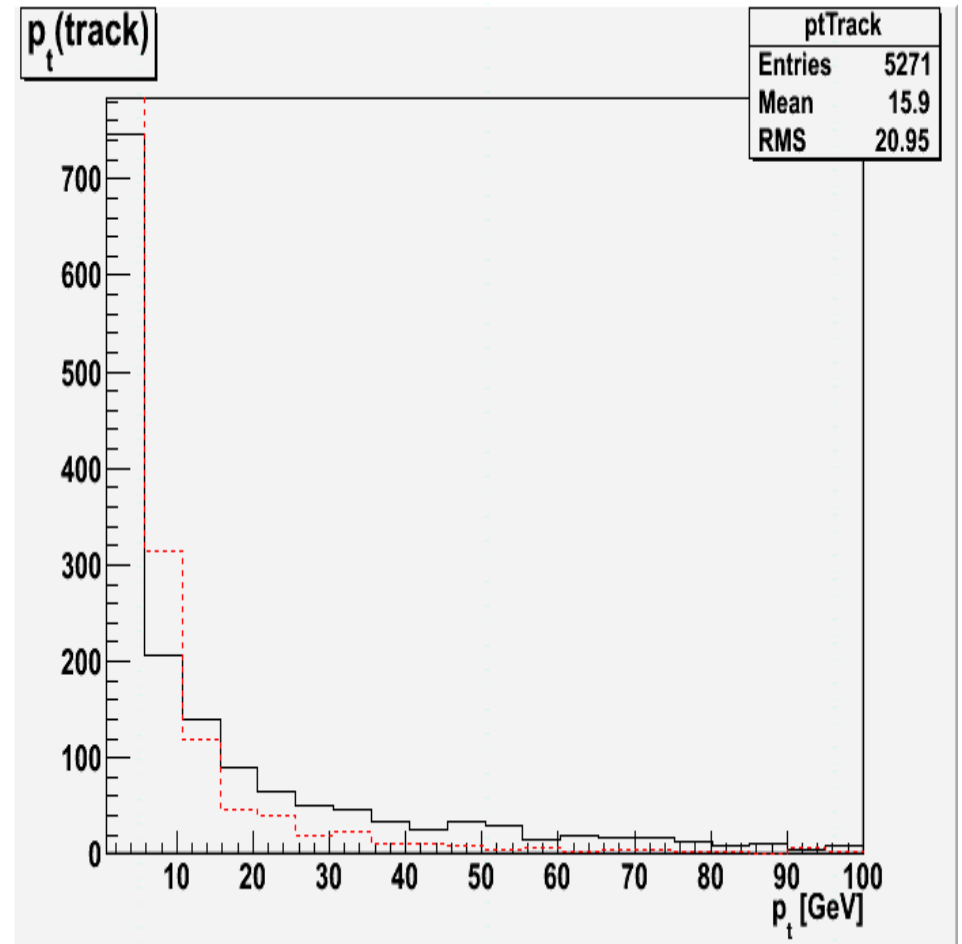
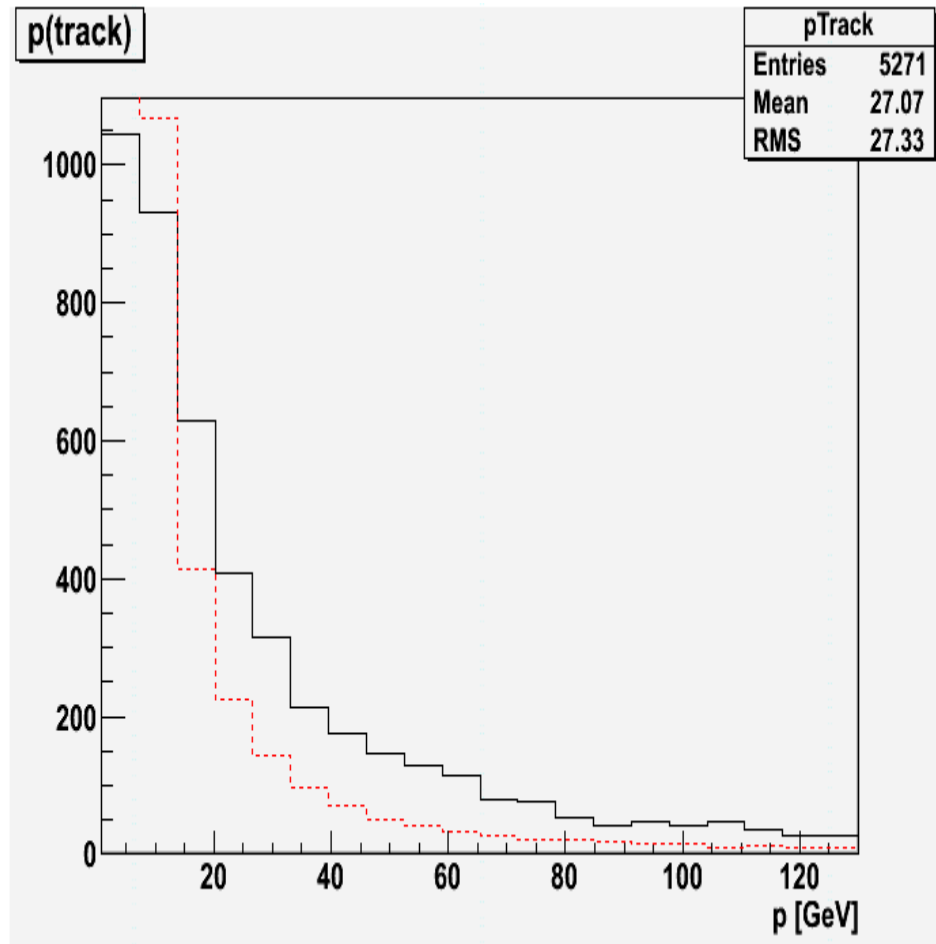
- Sample:
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- Selection:
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 - $0 < nTracks < 3$

Angular distributions

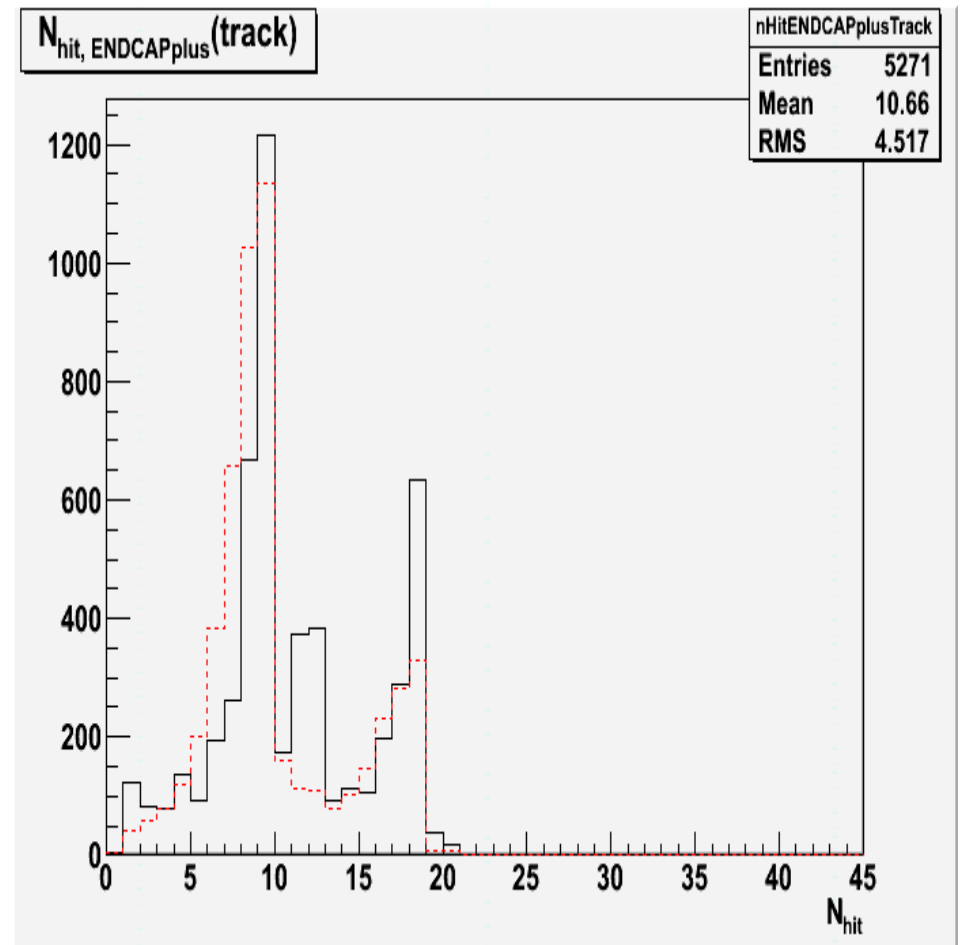
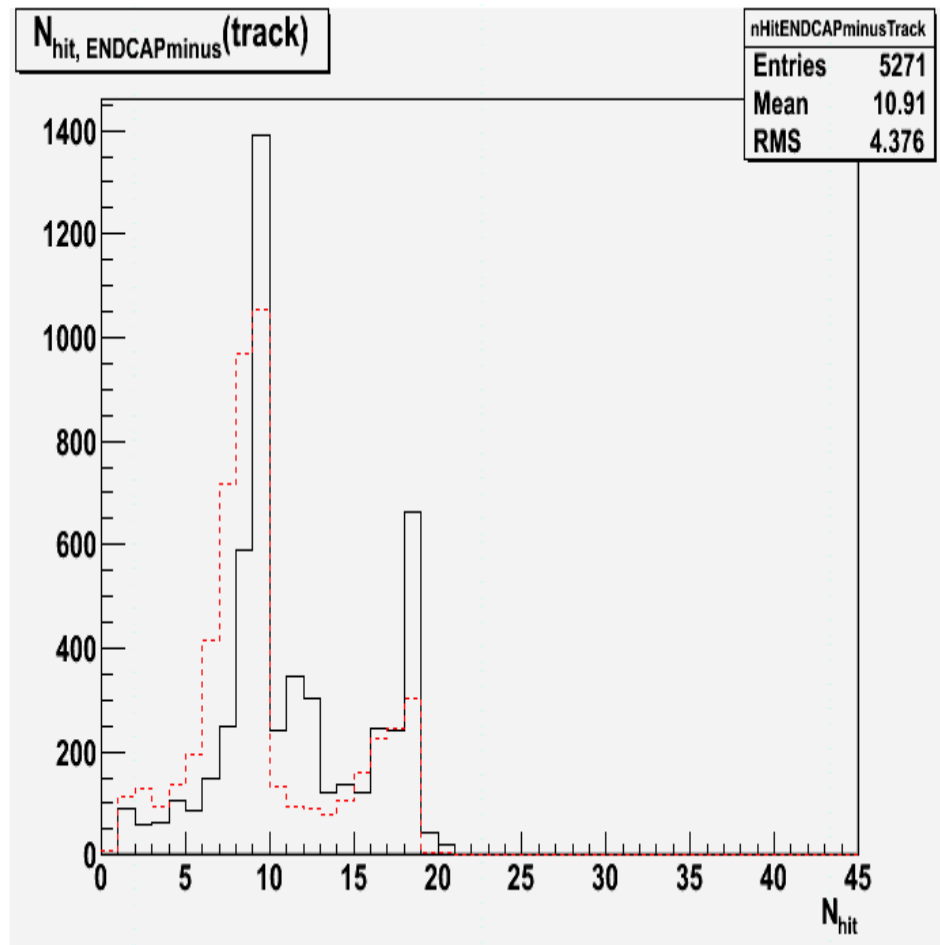
- Black solid line: data
- Red dashed line: MC



Momenta distributions

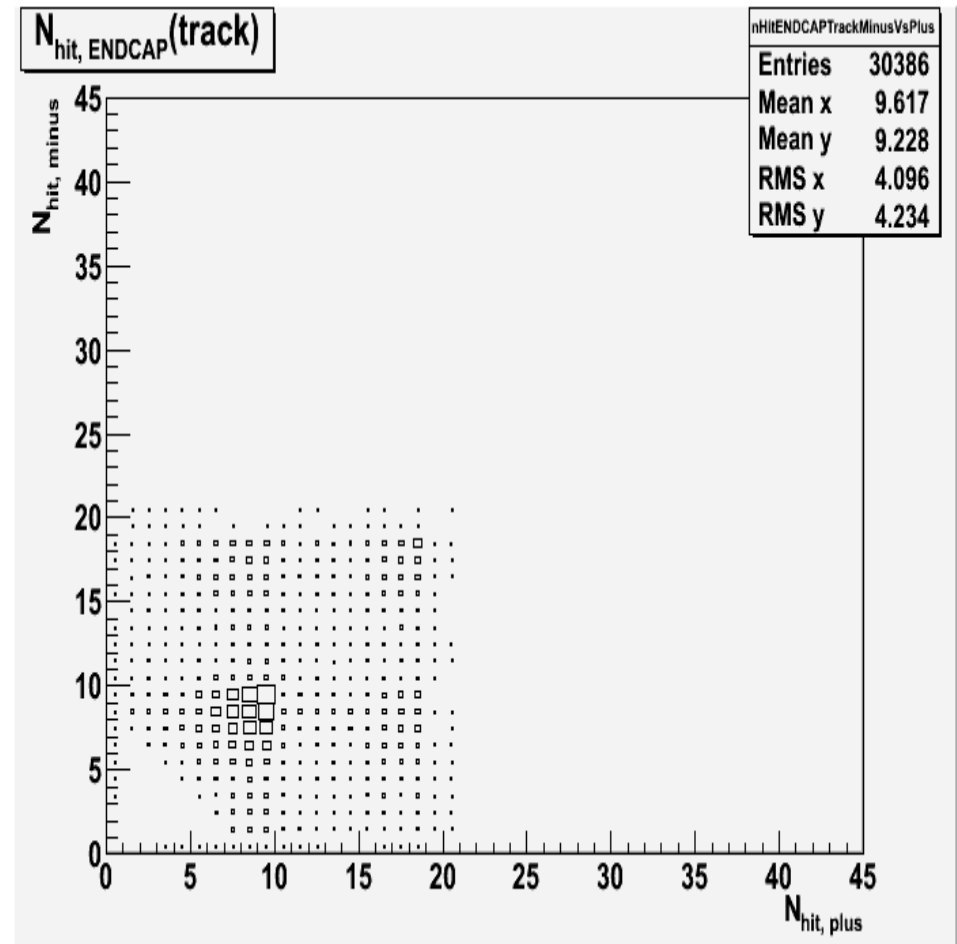
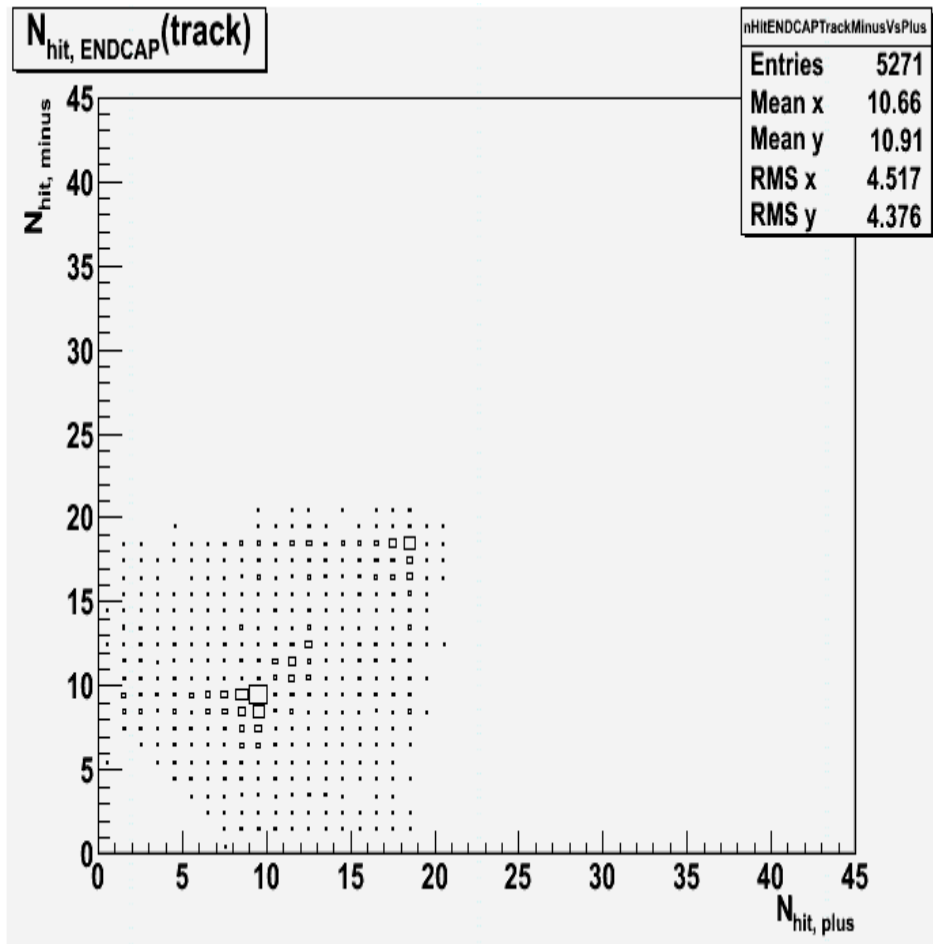


N_hits distributions



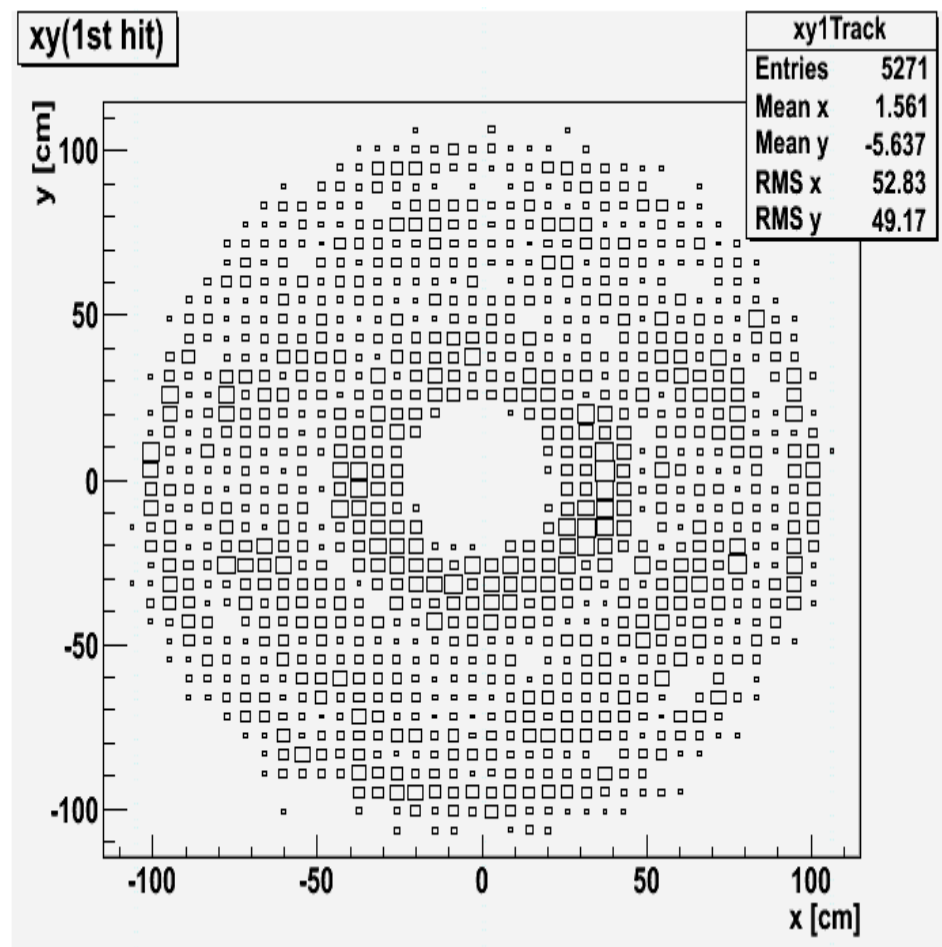
N_hits distributions

- Data:
- Monte Carlo:

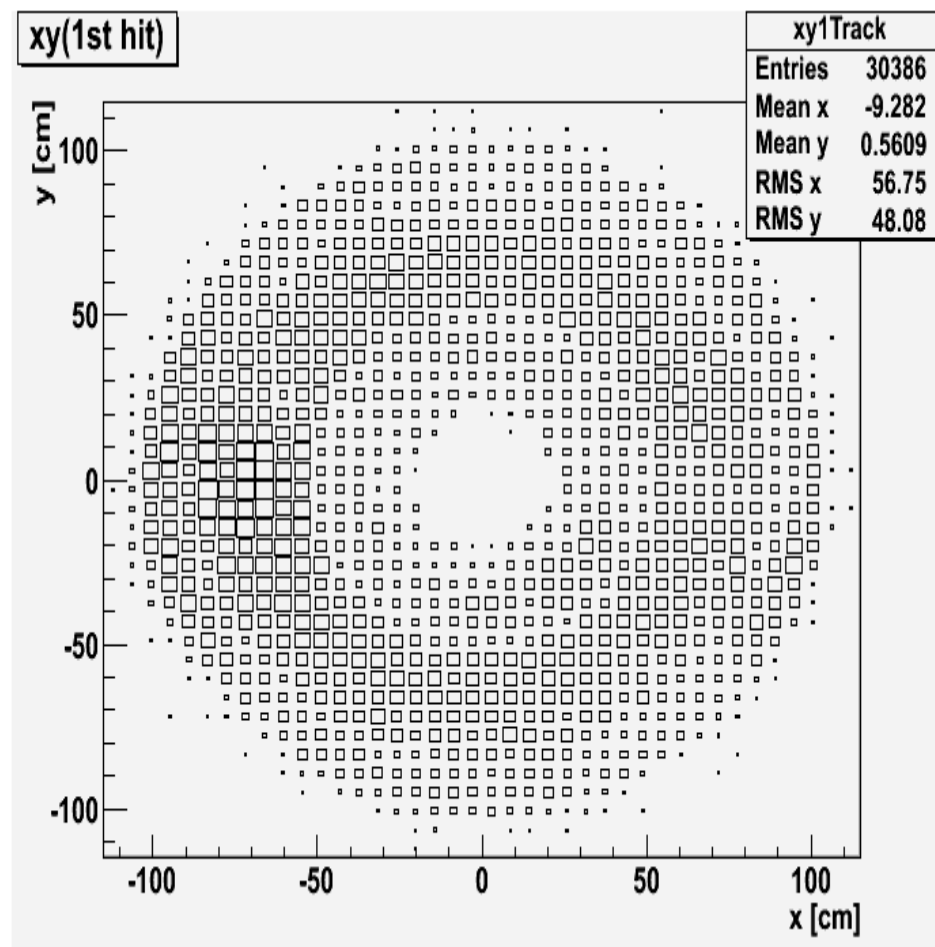


First hit distributions

- Data:

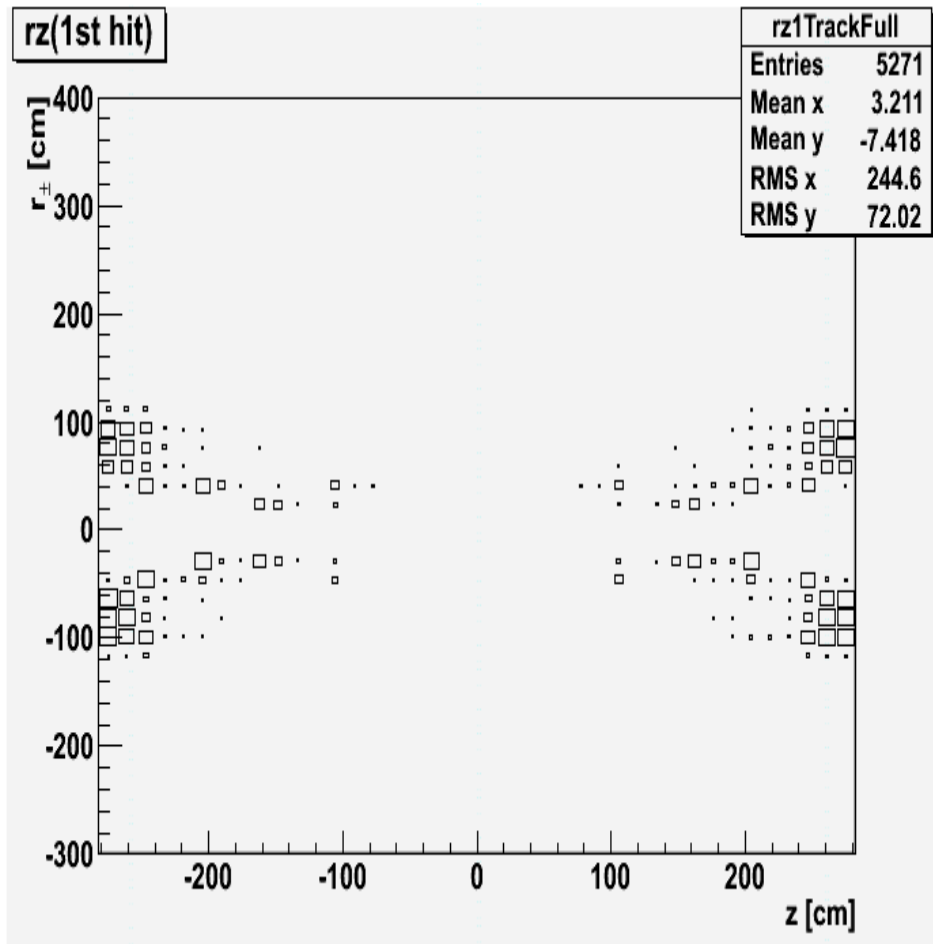


- Monte Carlo:



First hit distributions

- Data:



- Monte Carlo:

