TKR Proton and Pion hits

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TKR Hits in hadrons runs

- **The TKR hits and clusters have been studied**
  - **Whole TKR**
  - **Front TKR (plane > 12) thin planes**
  - **Back TKR (plane ≤ 12) thick and light planes**
- **The CU has been used as standalone detector, i.e. no geometrical cuts have been imposed**
  - **General Cuts:**
    - **At least one track**
    - **Last layer in the track == Layer 0 (Tkr1LastLayer == 0)**
    - **GTCC Fifo is not full (EventGtccFifo==0)**
  - **"MIP" Cuts: single particle energy deposition in the CAL, to reject eventual electron contamination and hadron interaction events**
    - **Total CAL raw energy between 50 and 150 MeV (at 0 deg incidence)**
    - **Single layer CAL raw energy between 6 and 16 MeV (at 0 deg incidence)**

Run summary at 0 deg

Number		Energy (GeV)	Position (mm)	MC physic
700001423	Proton	6	561, 13, 0	LHEP_BERT
700001419	Proton	10	561, 13, 0	LHEP_BERT
700002237	Proton	20	201, 40, -47	QGSP_BERT
700002363	Proton	100	201, 40, -47	QGSP_BERT
700001755	Proton	150	232, 45, -47	QGSP_BERT
700000813	Pion	5	187, 14, 0	NA
700002189	Pion	20	187, -14, 0	NA
700002190	Pion	20	187, 14, 0	NA
700002204	Pion	20	562, -14, 0	NA
700002205	Pion	20	562, 14, 0	NA

Proton 6 GeV: Hit and Cluster distributions
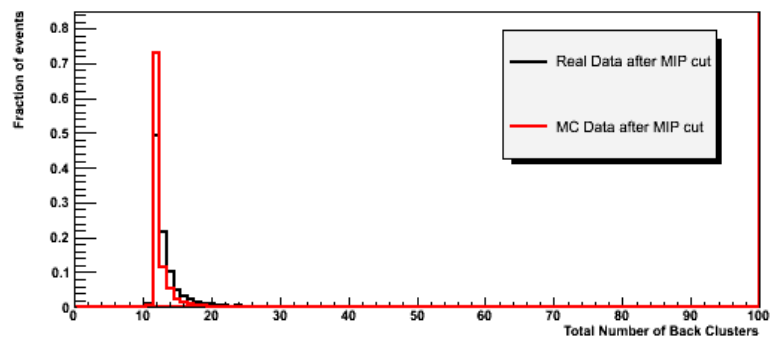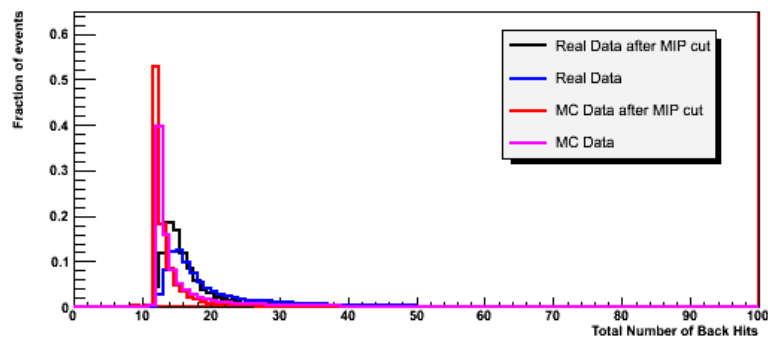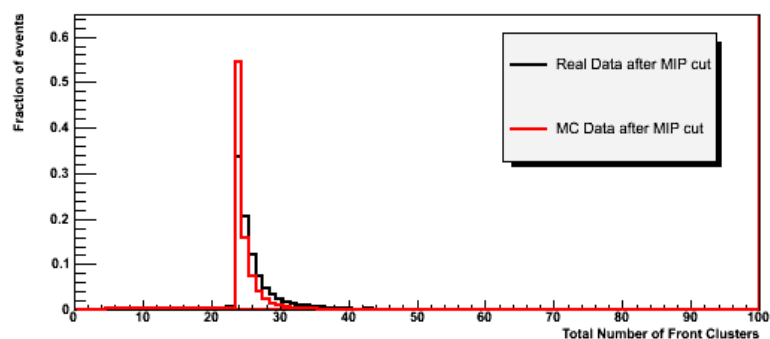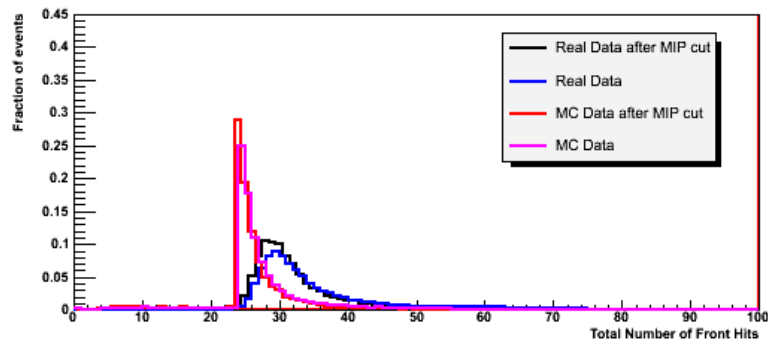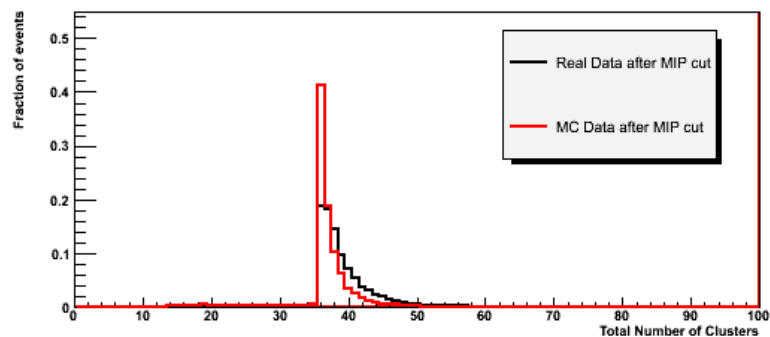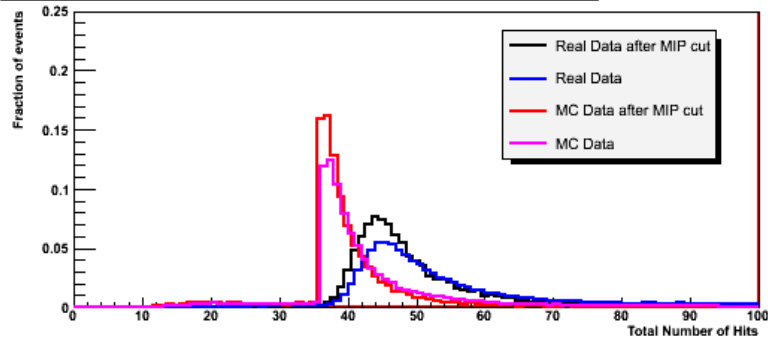
Proton 6 GeV: Hit and Cluster profiles

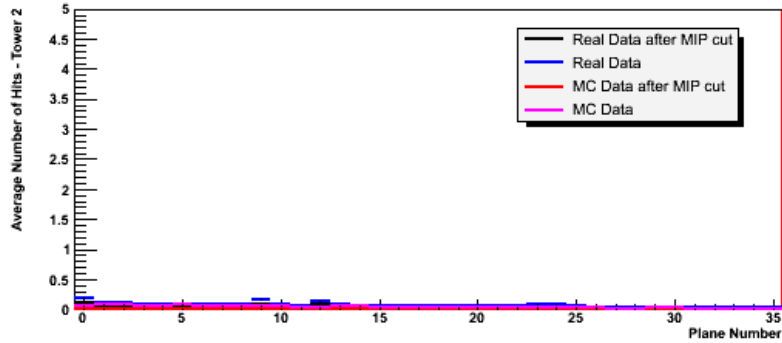Hits (left row) and Clusters (right row) Profile, Proton Run = 700001423
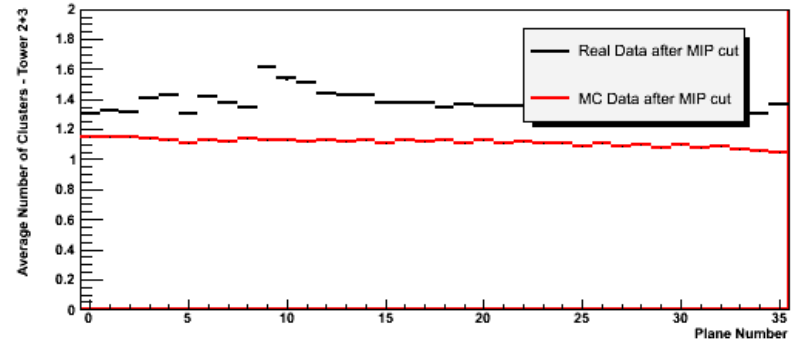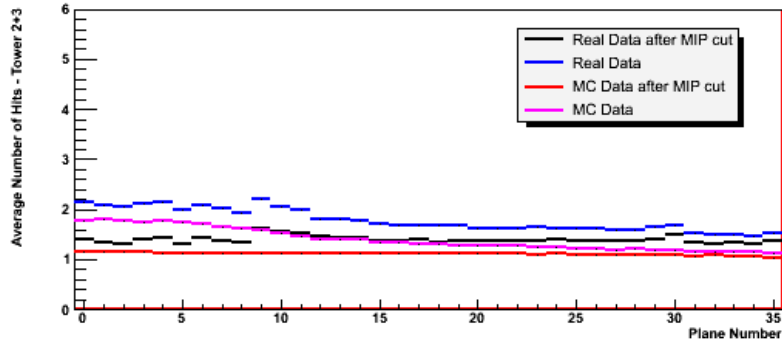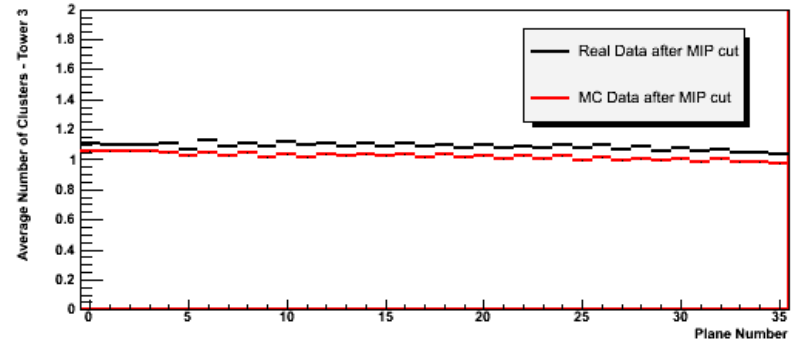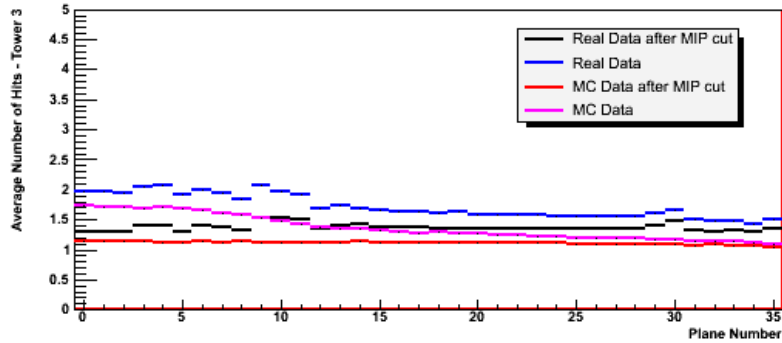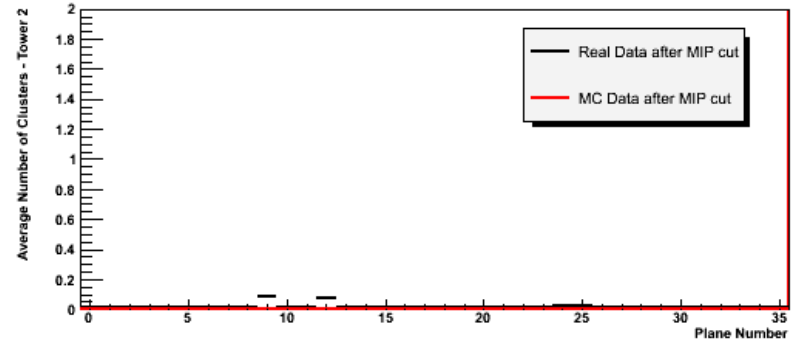
Proton 10 GeV: Hit and Cluster distributions

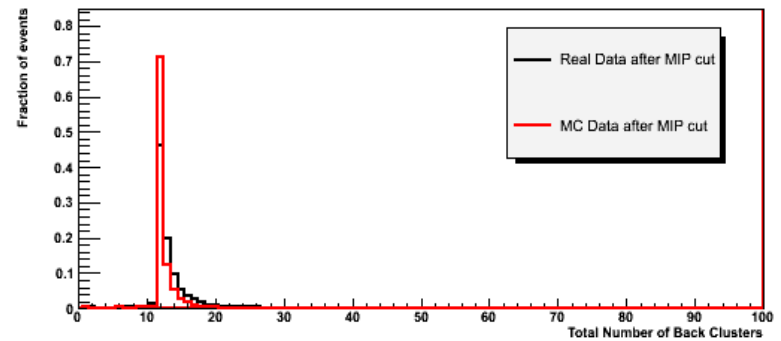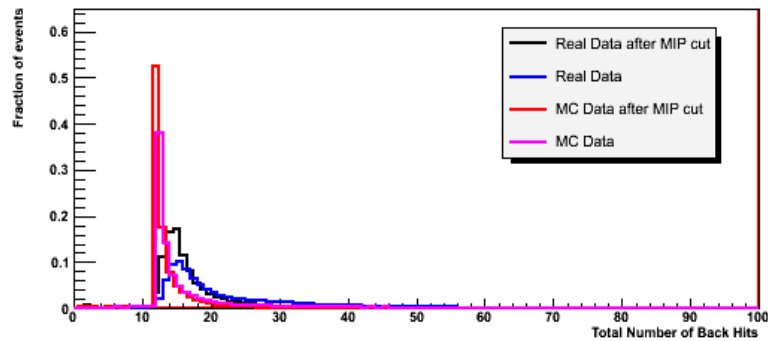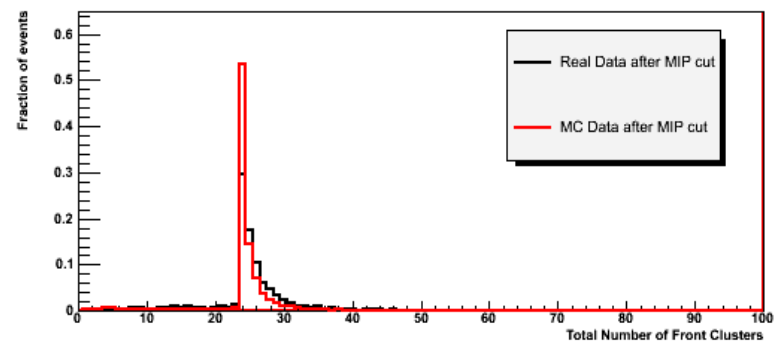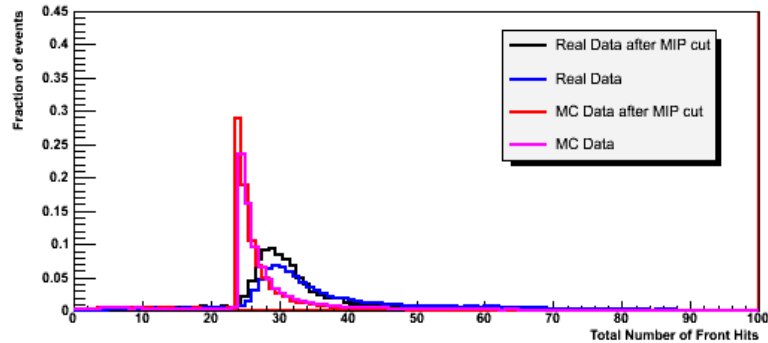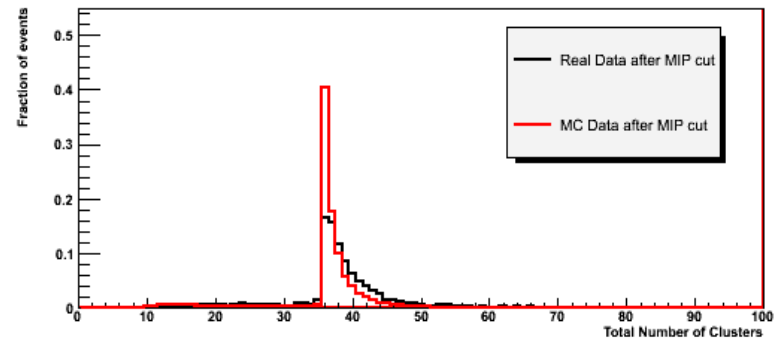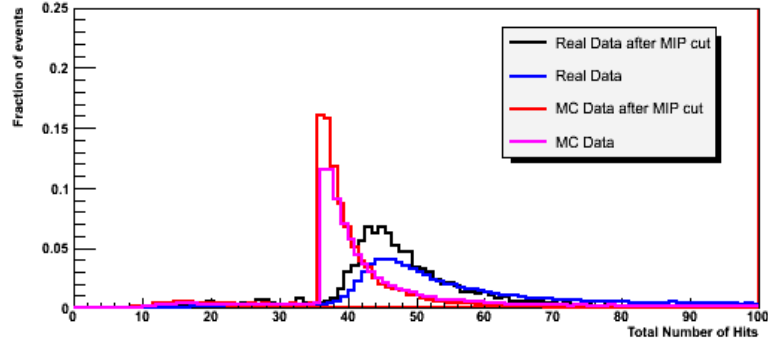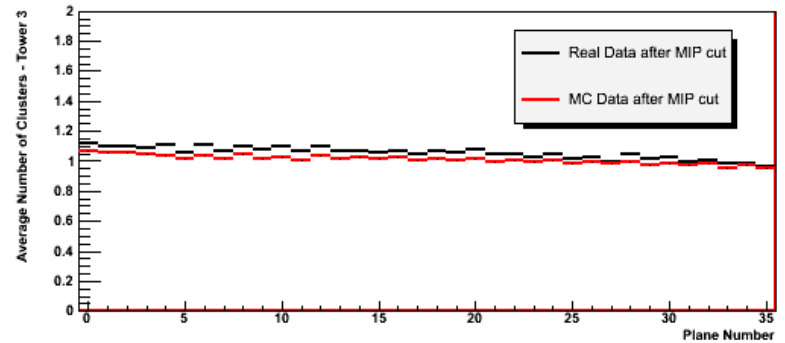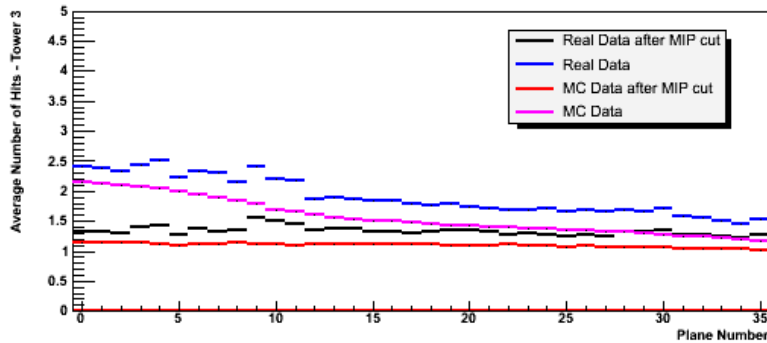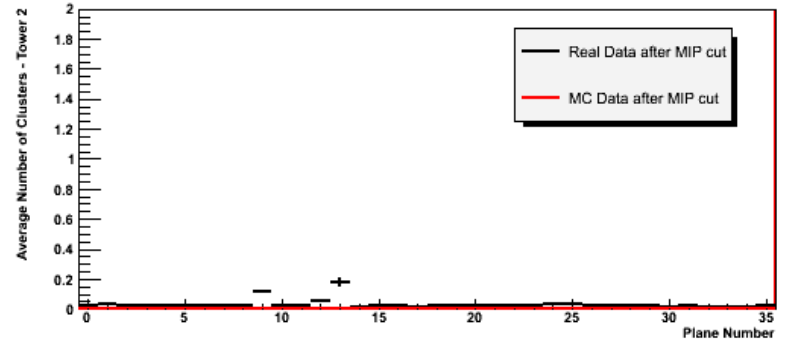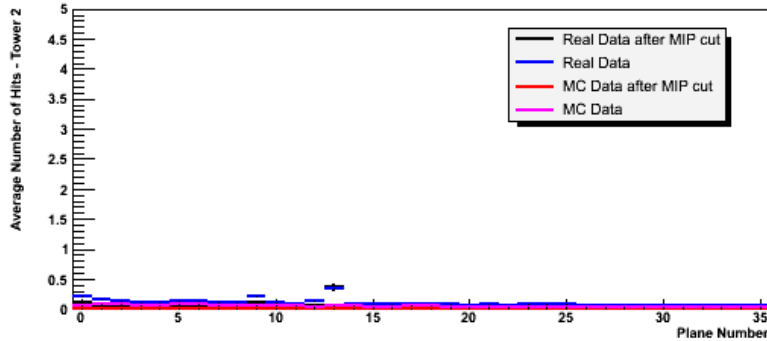Hits (left row) and Clusters (right row) Distributions, Proton Run = 700001419

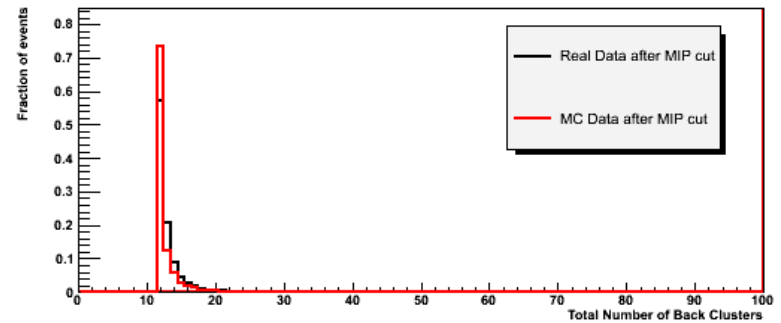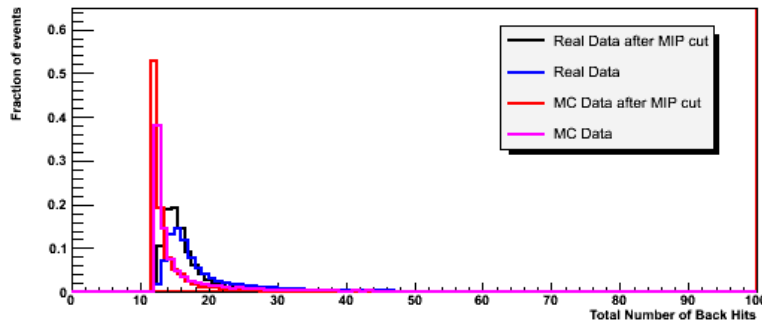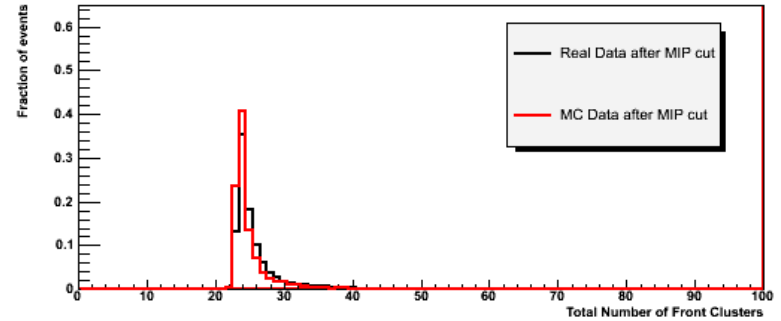# Proton 10 GeV: Hit and Cluster profiles
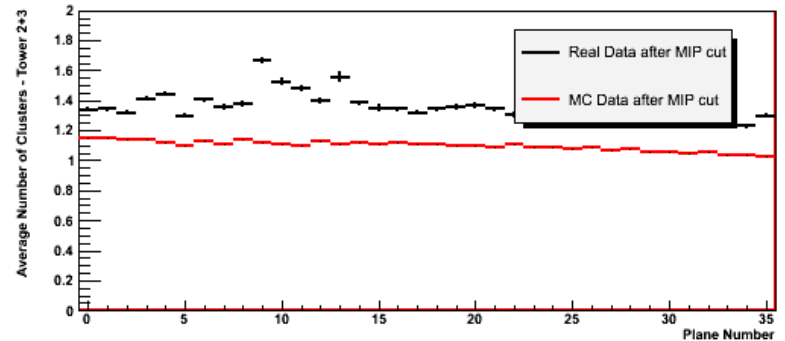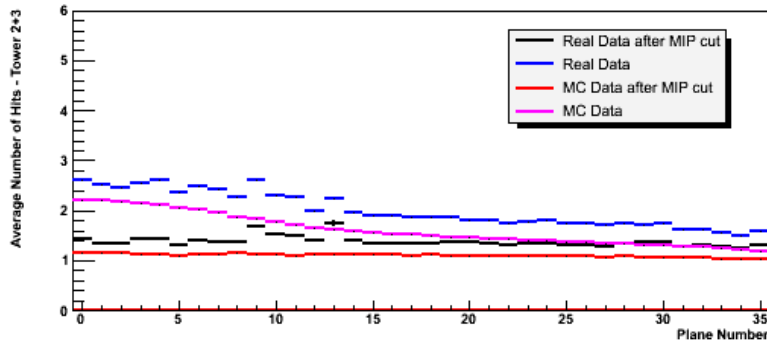
Proton 20 GeV: Hit and Cluster distributions

Hits (left row) and Clusters (right row) Distributions, Proton Run = 700002237
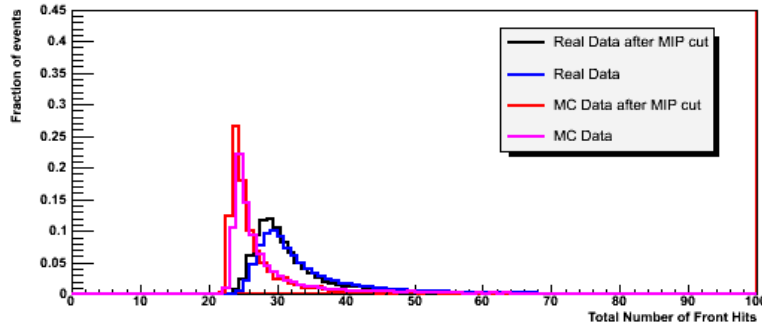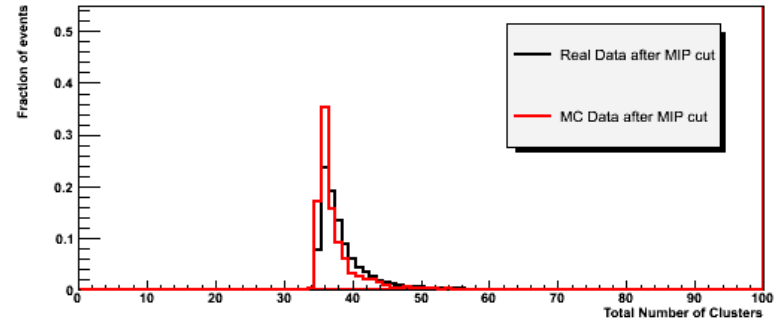
Proton 20 GeV: Hit and Cluster profiles
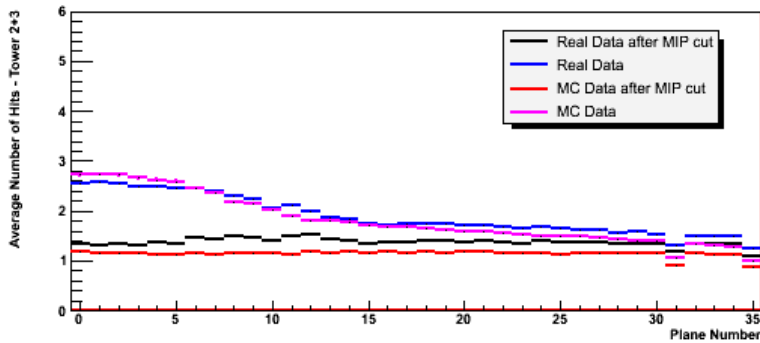
Proton 10 GeV: Hit and Cluster distributions

Proton 6 GeV: Hit and Cluster profiles
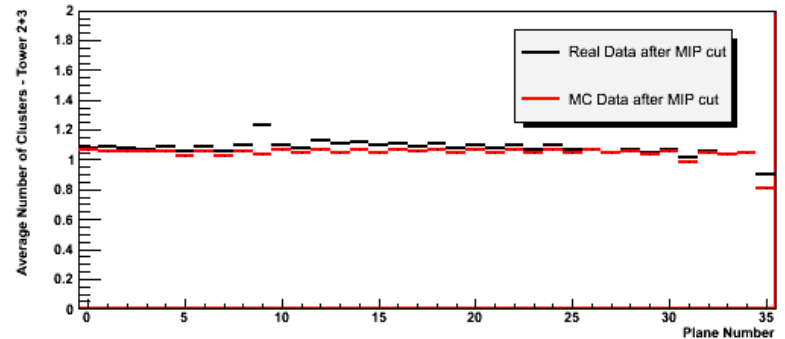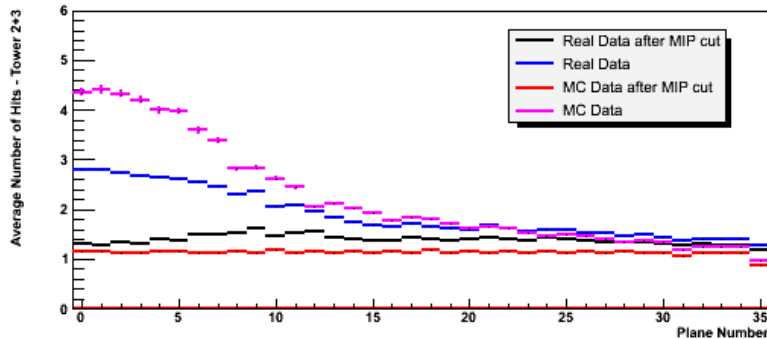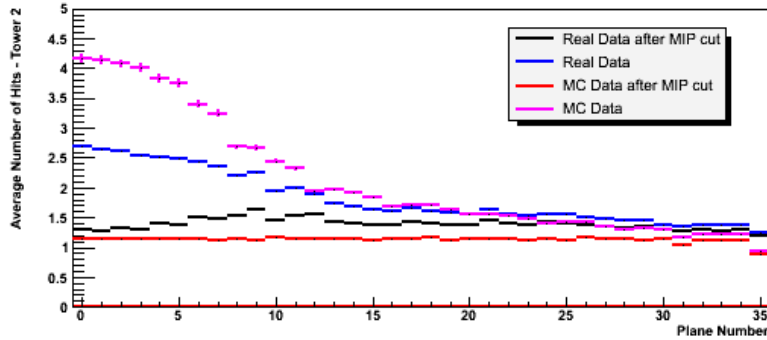
Proton 150 GeV: Hit and Cluster distributions

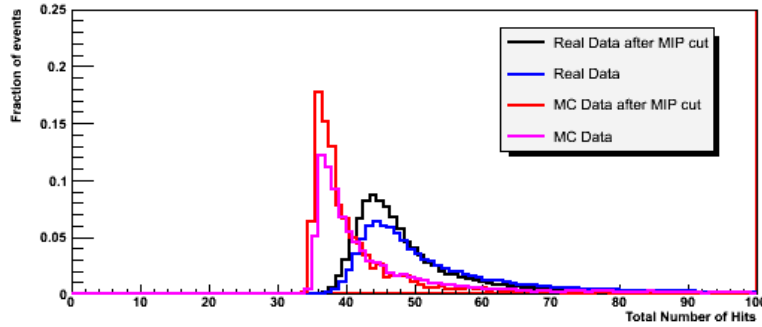Hits (left row) and Clusters (right row) Distributions, Proton Run = 700001755

Proton 150 GeV: Hit and Cluster profiles

Hits (left row) and Clusters (right row) Profile, Proton Run = 700001755
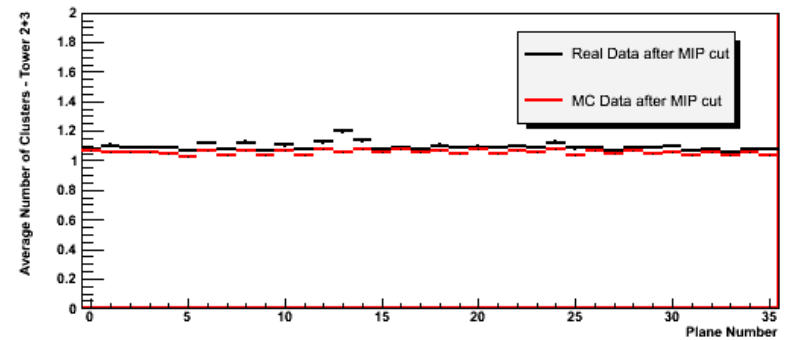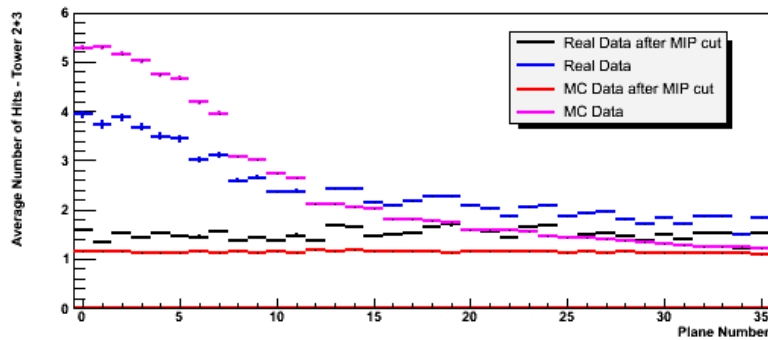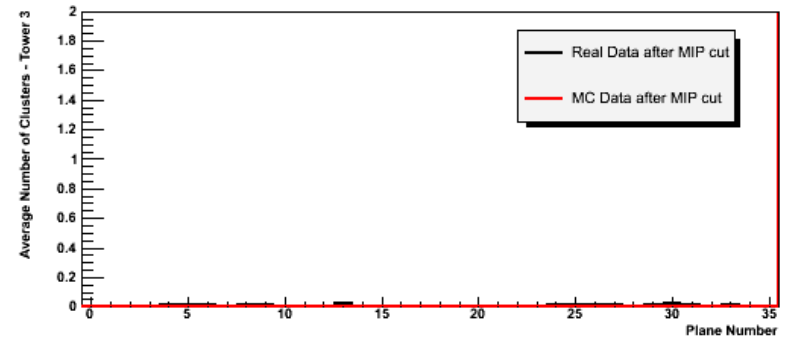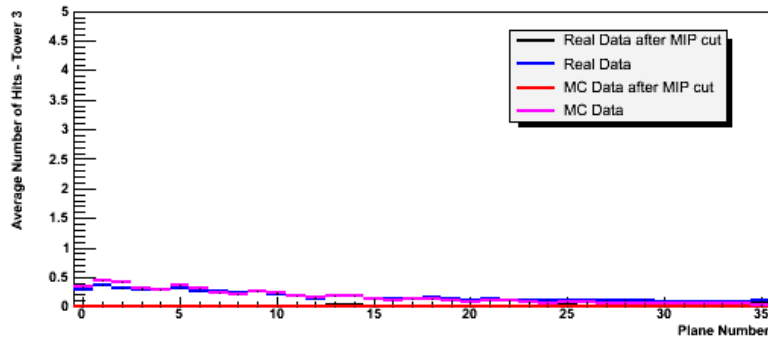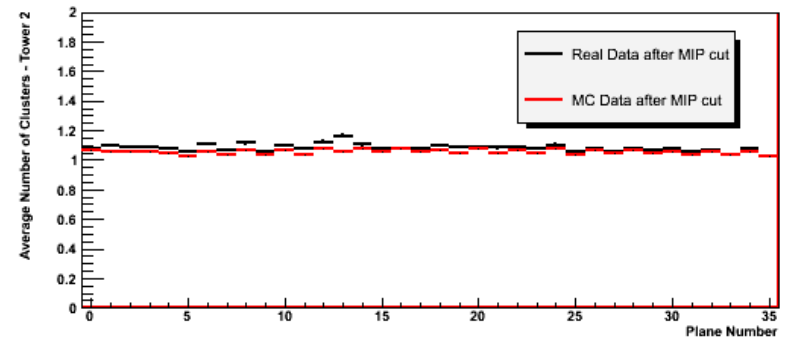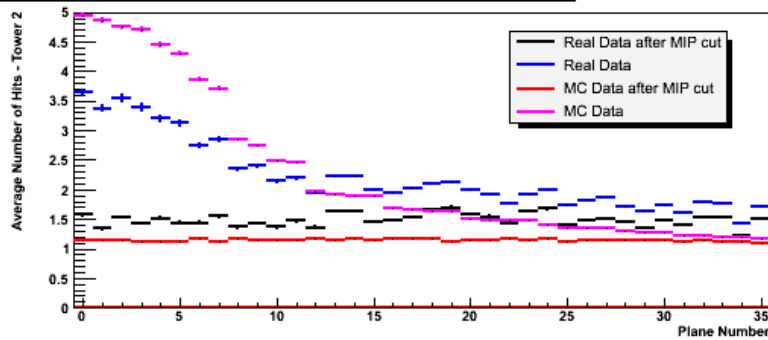
Hit Summary at 0 deg
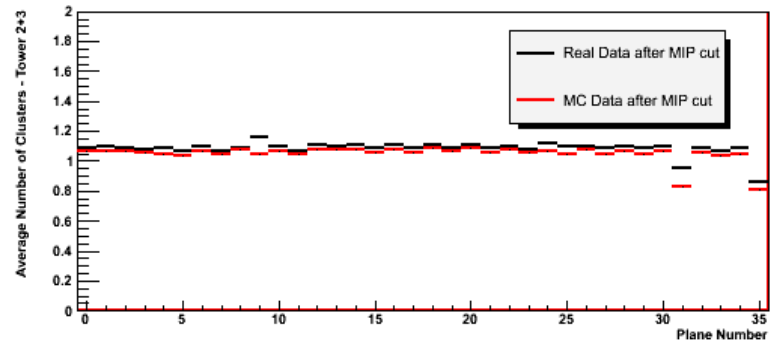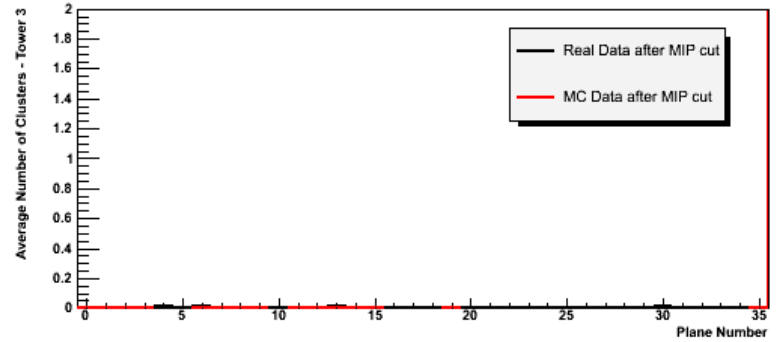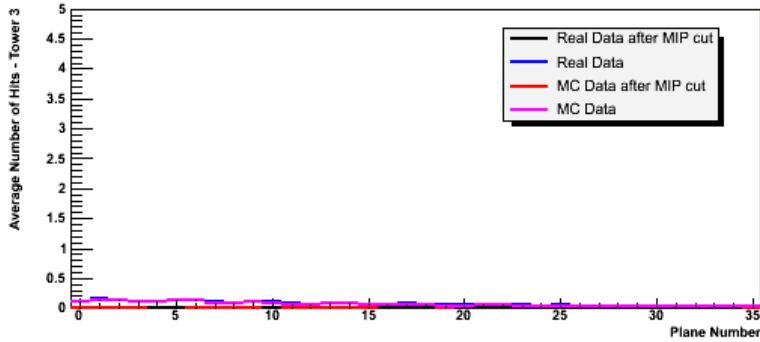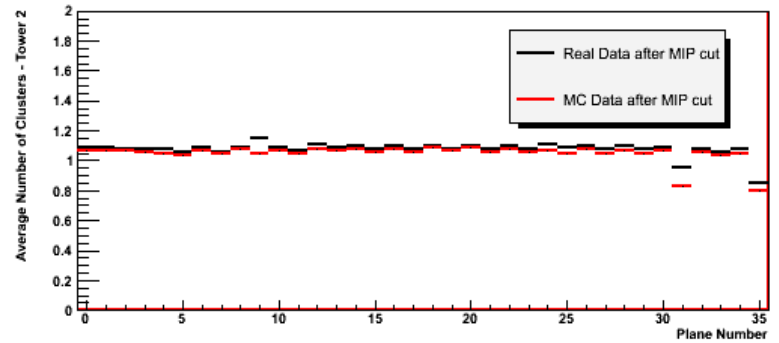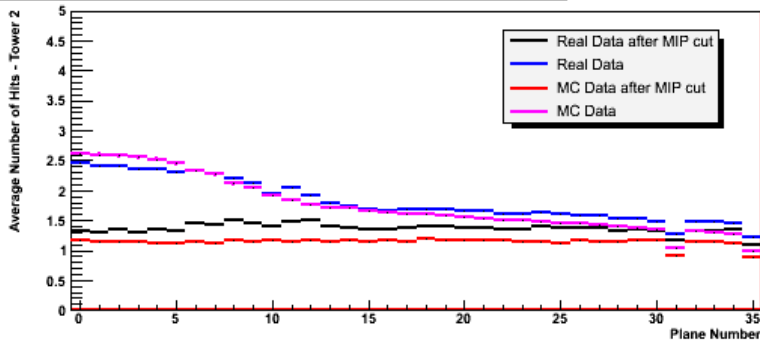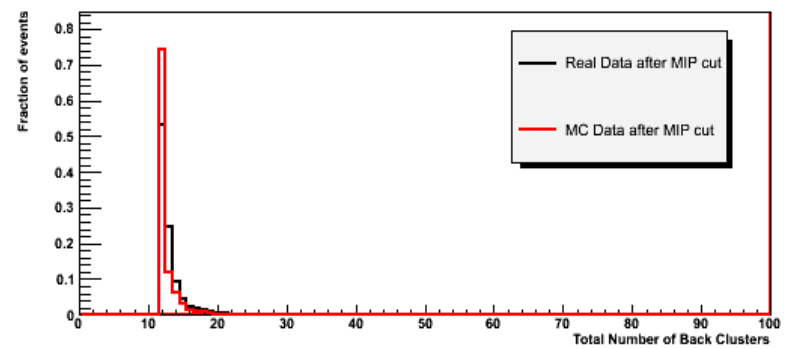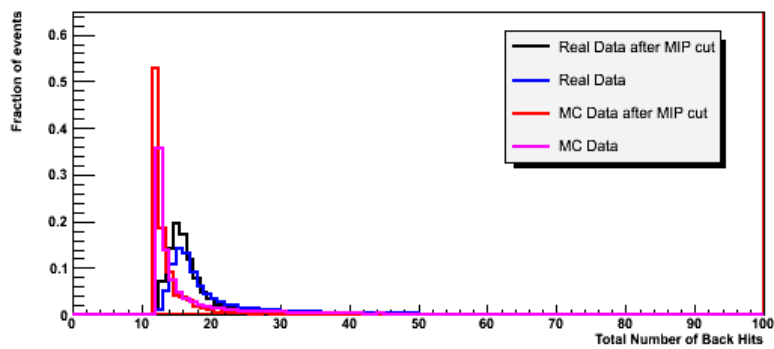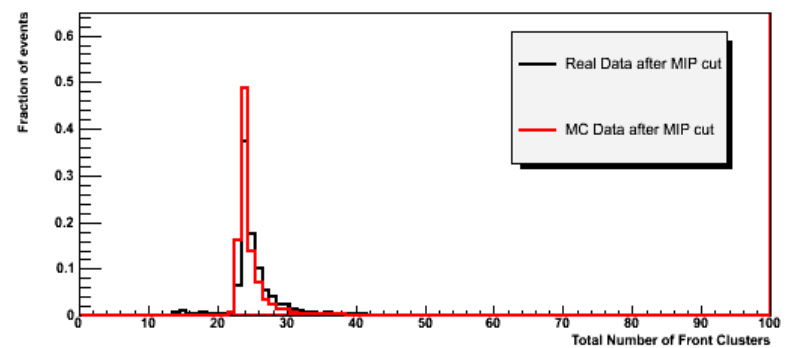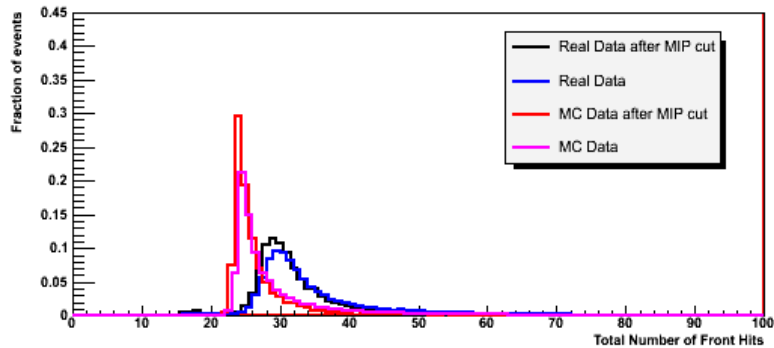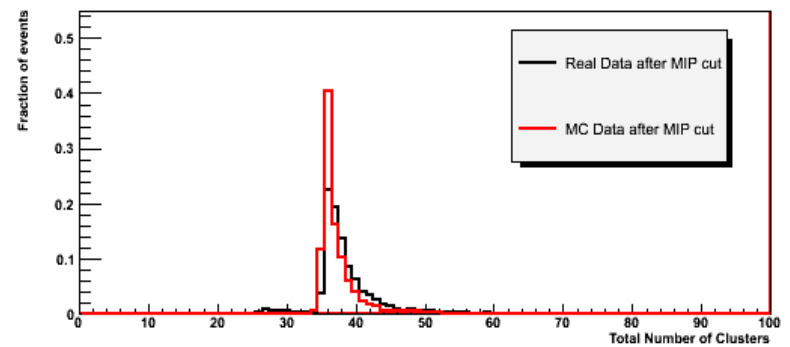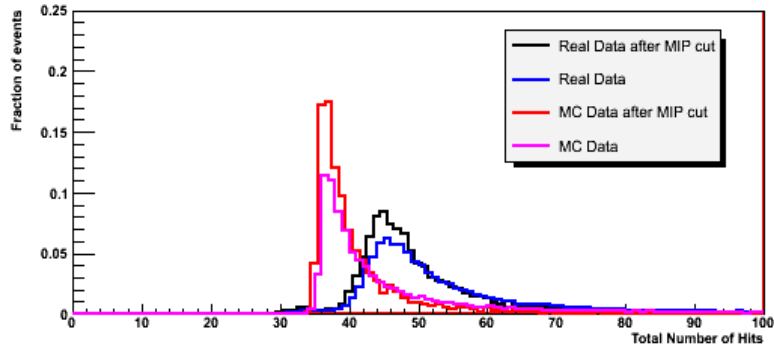

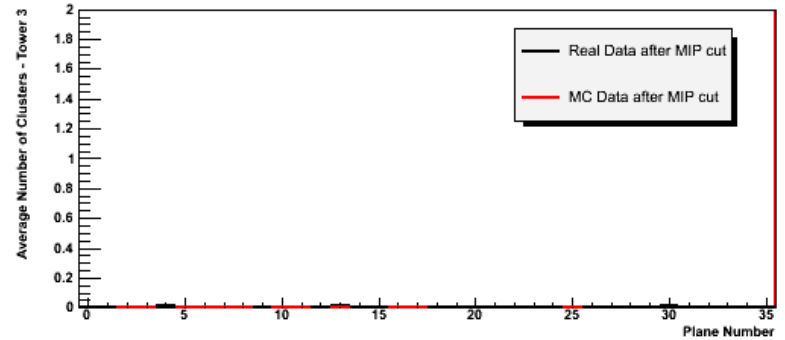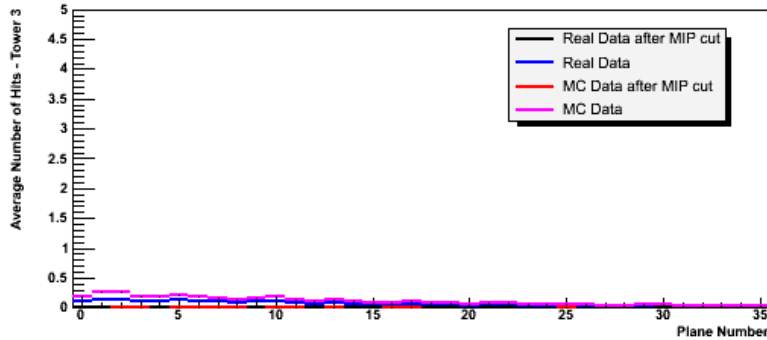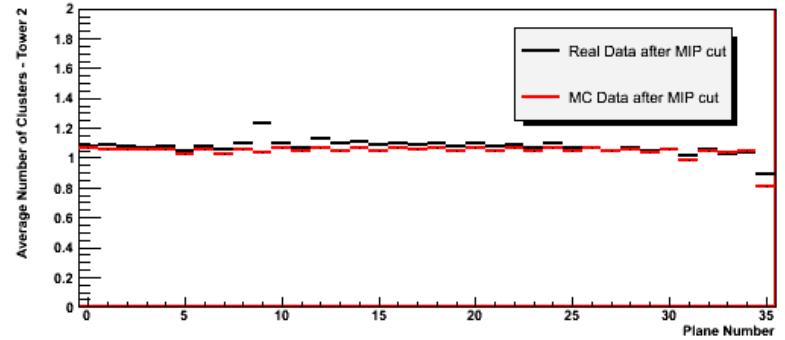Average Number of TKR Hits Vs Energy, Angle =   0 deg

Legend:
- Protons Data: Total Hits
- Protons Data: Total Front Hits
- Protons Data: Total Back Hits
- Protons MC Data: Total Hits
- Protons MC Data: Total Front Hits
- Protons MC Data: Total Back Hits
- Pions Data: Total Hits
- Pions Data: Total Front Hits
- Pions Data: Total Back Hits

Y-axis: Average Number of TKR Hits

X-axis: Energy (GeV)

Hit Summary at 0 deg after MIP cuts

MIP Cuts - Average Number of TKR Hits Vs Energy, Angle = 0 deg

Legend:
- Protons Data: Total Hits
- Protons Data: Total Front Hits
- Protons Data: Total Back Hits
- Protons MC Data: Total Hits
- Protons MC Data: Total Front Hits
- Protons MC Data: Total Back Hits
- Pions Data: Total Hits
- Pions Data: Total Front Hits
- Pions Data: Total Back Hits

Cluster Summary at 0 deg after MIP cuts

MIP Cuts - Average Number of TKR Clusters Vs Energy, Angle = 0 deg
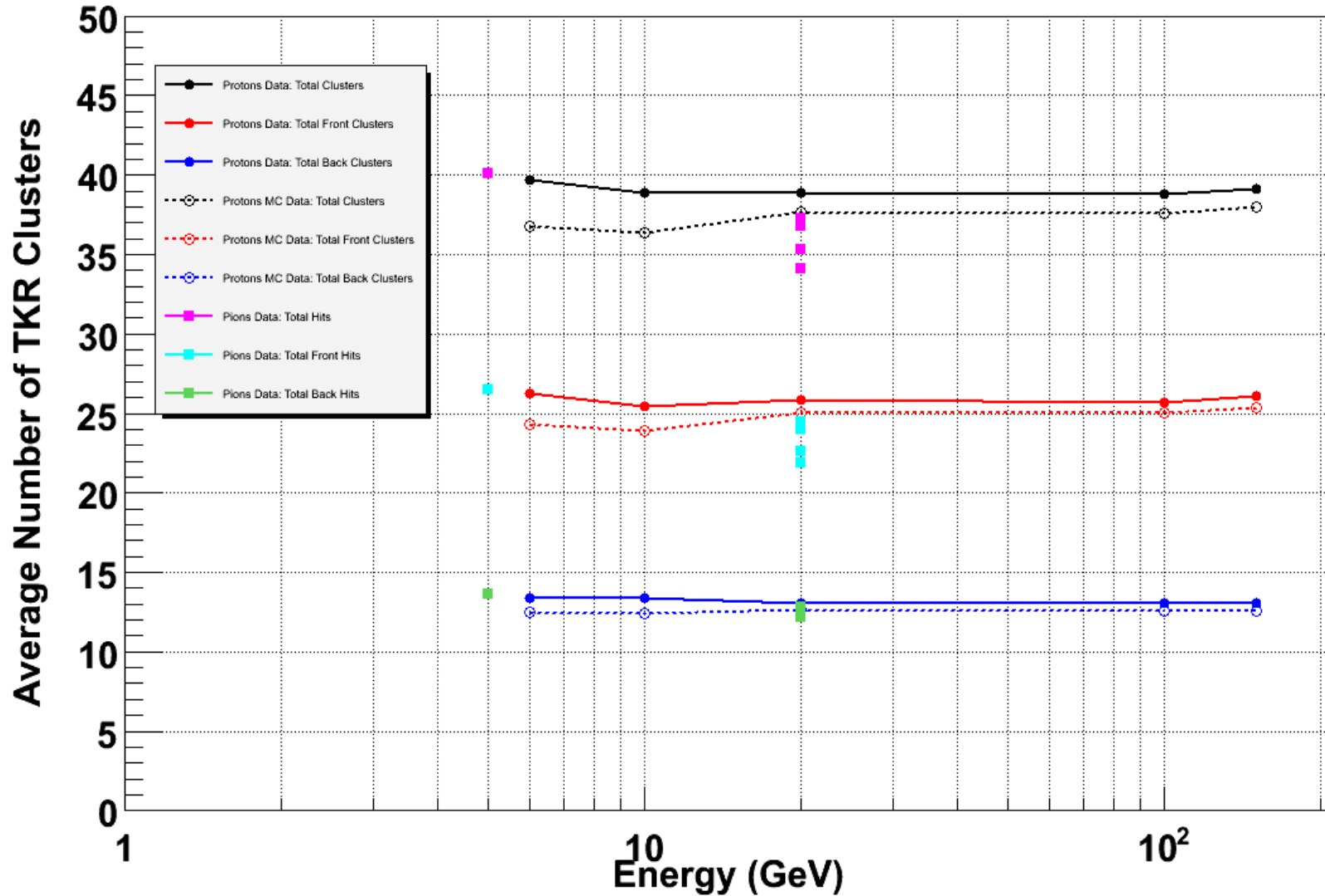
Cluster size studies

- The cluster size has been studied layer by layer for single clusters belonging to the track, by using the recon root files.

Proton run 1423: Cls Size distributions Vs Plane

Black: Data Red: MC
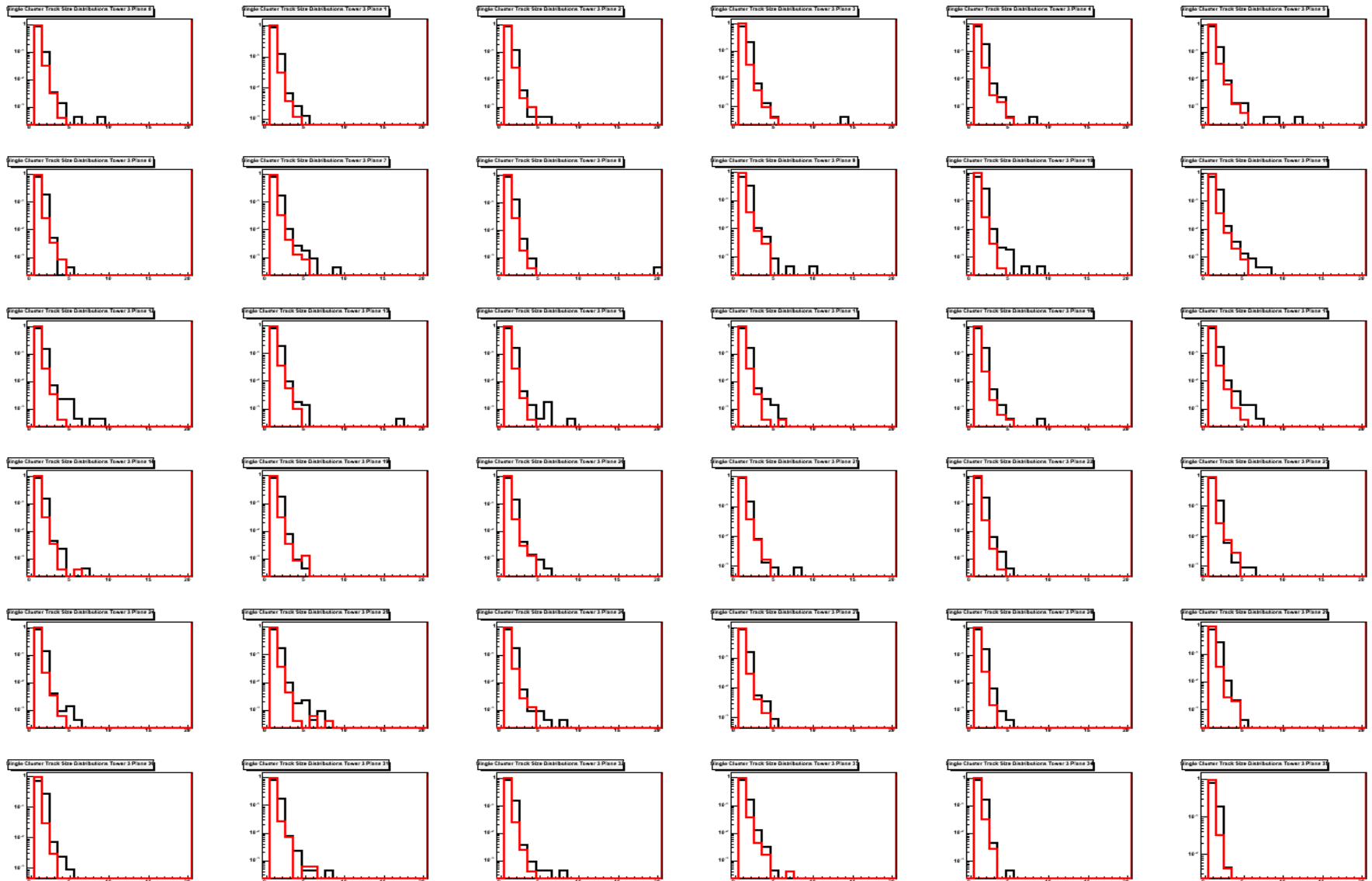
Proton run 1423: Cls size Vs Plane

Average Cluster Size Vs Plane, Tower = 3

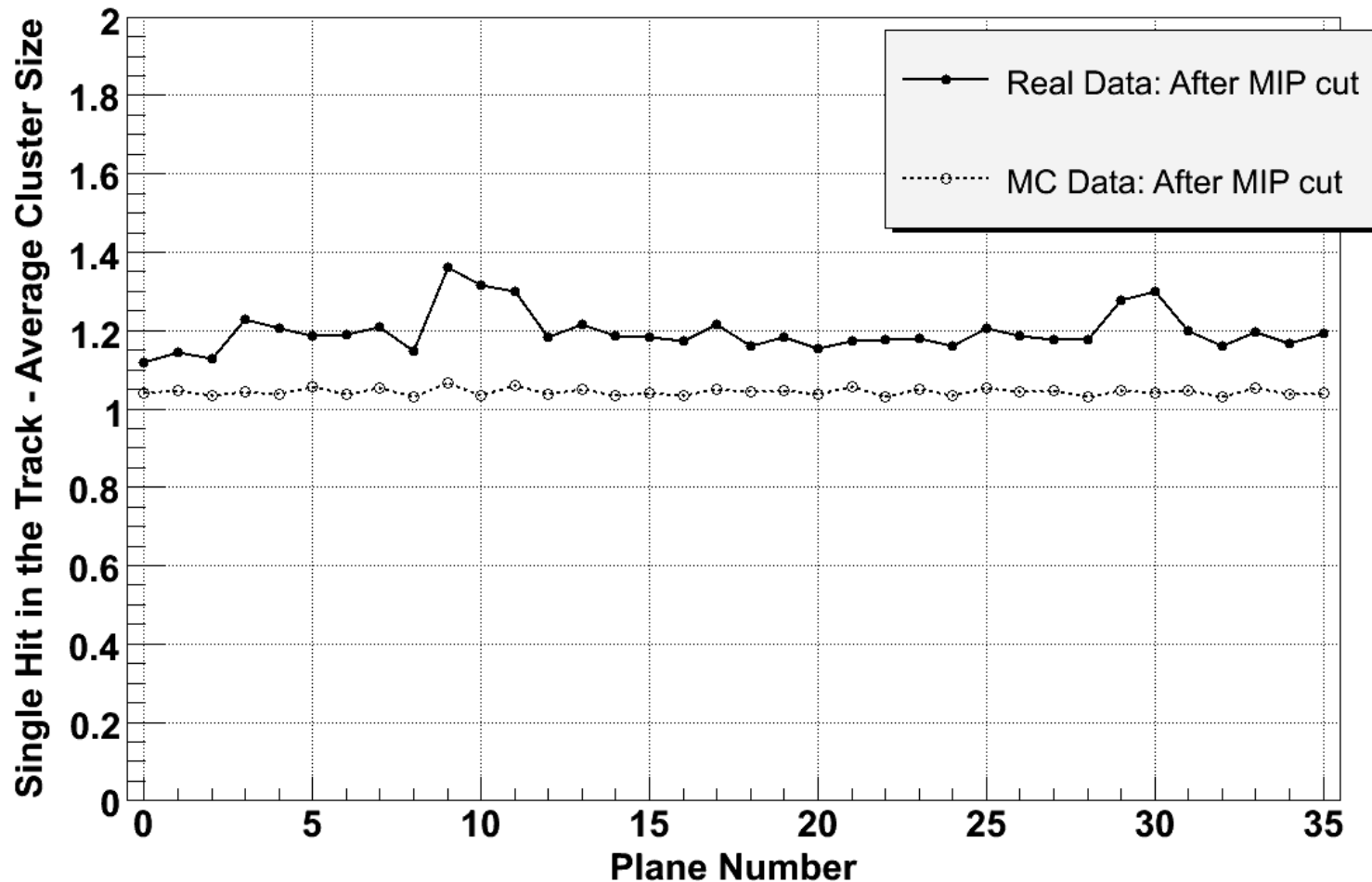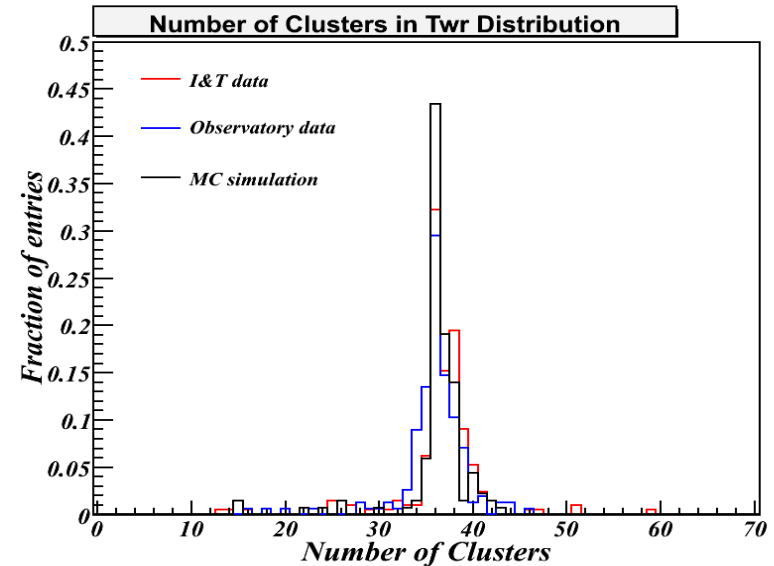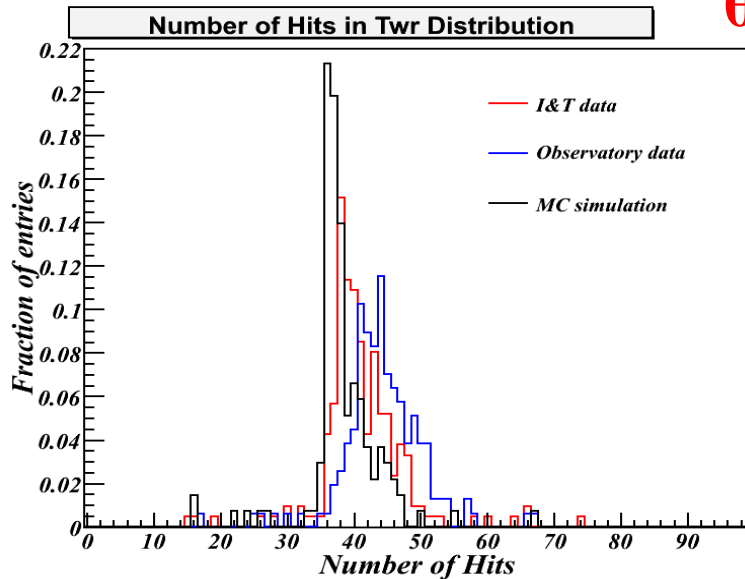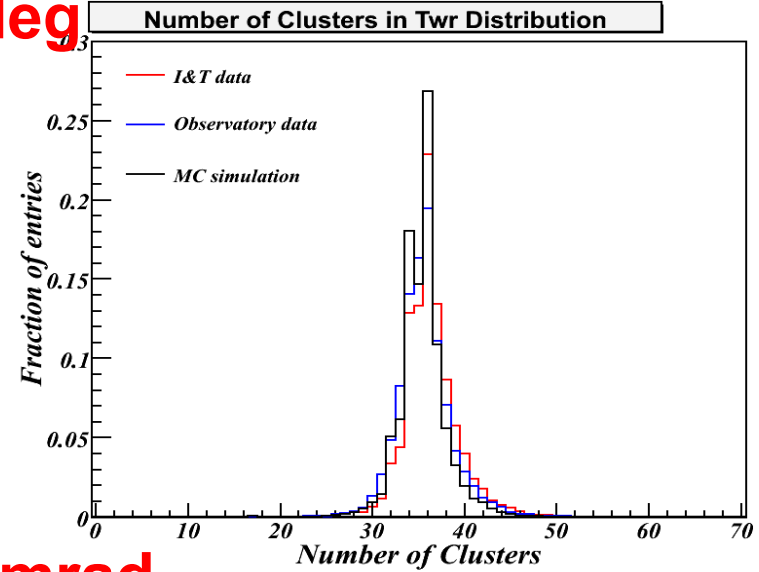# Cross check with muons at sea level

θ < 10 deg

θ < 10 mrad
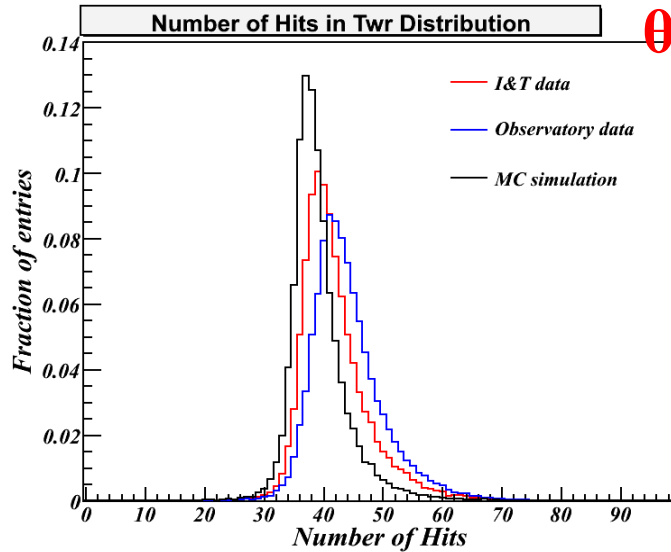
See Claudia Monte talk at C&A group

Nicola Mazziotta - BT EVO Jul 17, 2007

	Average value ± RMS		
	Observatory data (V7r0913p11)	**I&T data**	**MC simu (EM-v6r070329p28)**
$\theta \leq 10°$	**44,05 ± 6,32**	**41,89 ± 6,13**	**39,20 ± 5,16**
$\theta \leq 10$ *mrad*	**44,15 ± 6,15**	**41,14 ± 6,47**	**38,29 ± 5,54**

Conclusions

- The QGSP_BERT model seems to produce a lot of hits in the tracker, in particular in the back layers

- The Hit MC to Data Ratio is about 0.8 after the MIP cut

- The MC clusters size could increase with the last TKRDigit that includes the charge sharing effect