Report of activities

13/04/2013

Outline

- MC/Data sample
- Final comments

Comments to:
Mario Rodríguez Cahuantzi
<mrodrigu@mail.cern.ch>

Puebla HEP meeting

⌘ Cosmic runs: summary of statistics for 2011 data (NO BEAM RUNS)

We are going to compare the MC vs 2011 data (14.81 days)

YEAR	PERIOD	# RUNS	DURATION (DAYS)	# OF EVENTS	# OF ANALYZED EVENTS	Live time analyzed (days)
2011	LHC11a	41	5.41	39,646,338	38,853,411	5.30
	LHC11b	21	1.24	6,188,454	4,612,176	0.92
	LHC11c	32	2.12	9,545,193	8,246,834	1.83
	LHC11d	70	4.82	9,350,408	9,168,457	4.72
	LHC11e	26	1.78	4,617,867	4,580,220	1.76
	LHC11f	5	0.28	667,697	667,697	0.28
TOTAL		195	15.65	70,015,957	66,128,795	14.81

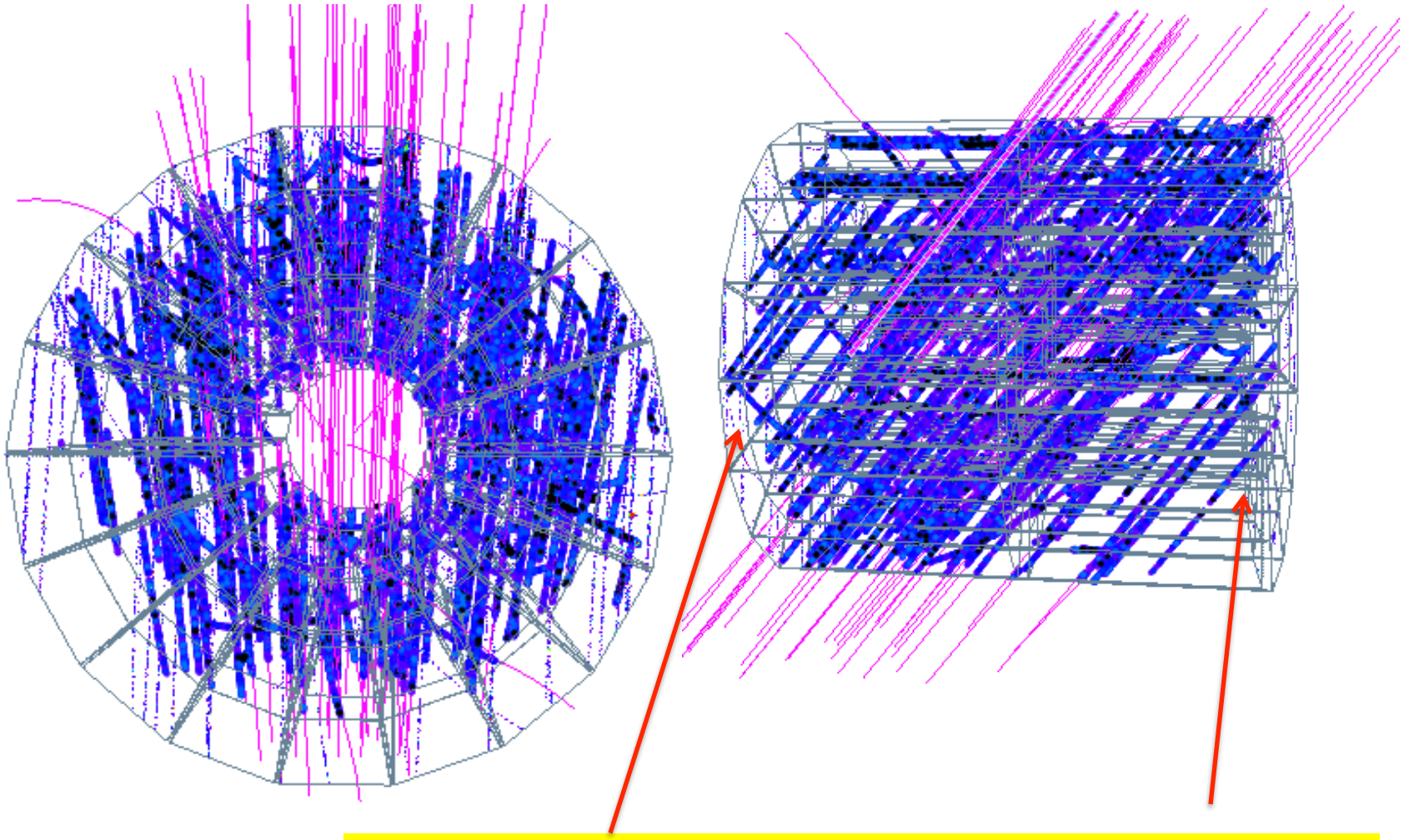
- MC - sample

For the TPC reconstruction, we selected only those events with at least 4 muons in the large area:

Chunk	#events (Fe)	#events (Fe) #mu>4
Fe_tree_1014_1015_wrall_1.root	1,410,000	7,417
Fe_tree_1014_1015_wrall_2.root	1,410,000	7,473
Fe_tree_1014_1015_wrall_3.root	1,410,000	7,335
Fe_tree_1014_1015_wrall_4.root	889,358	4,678
Fe_tree_1015_31015_wrall_1.root	88,122	19,235
Fe_tree_31015_1016_wrall_1.root	12,453	8,117
Fe_tree_1016_31016_wrall_1.root	1,094	1,063
Fe_tree_31016_1017_wrall_1.root	124	120
Fe_tree_1017_31017_wrall_1.root	10	10
Fe_tree_31017_1018_wrall_1.root	1	1

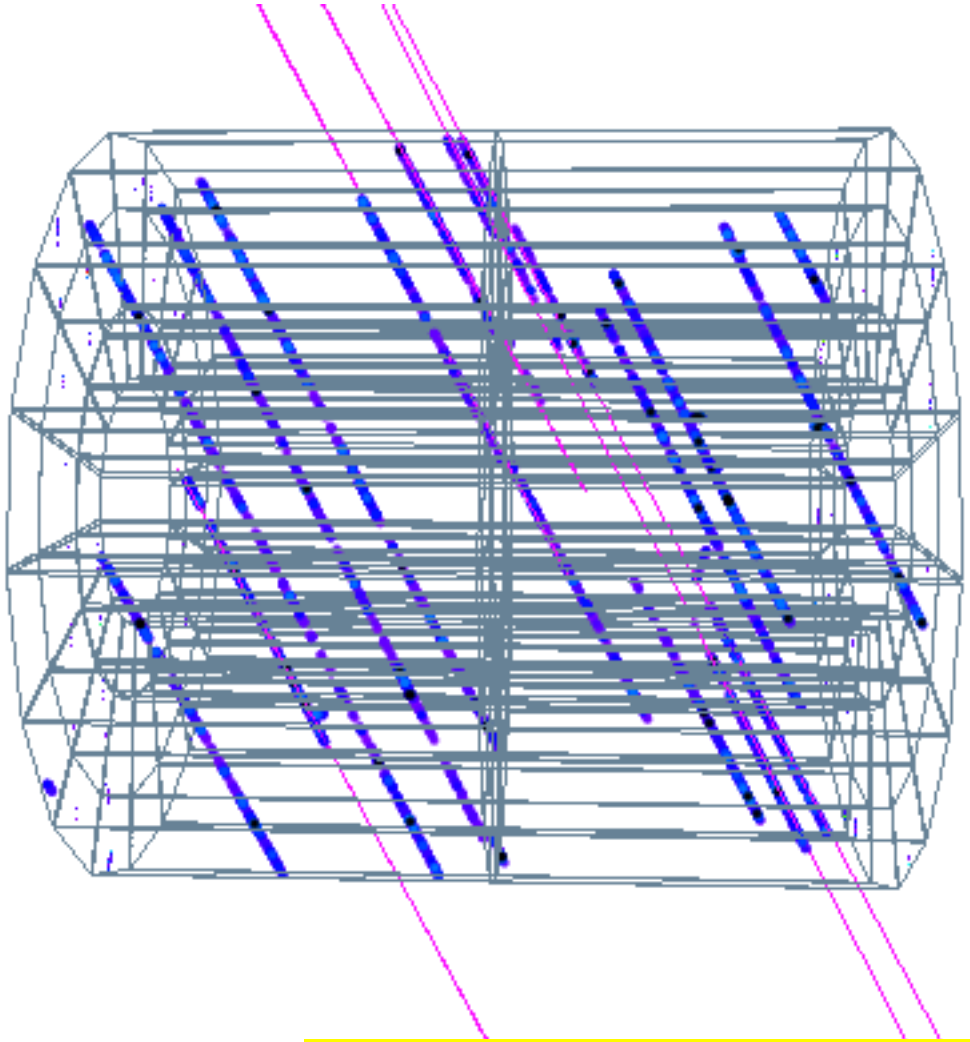
561 chunks → 55,449 events generated and reconstructed with the TPC

- MC



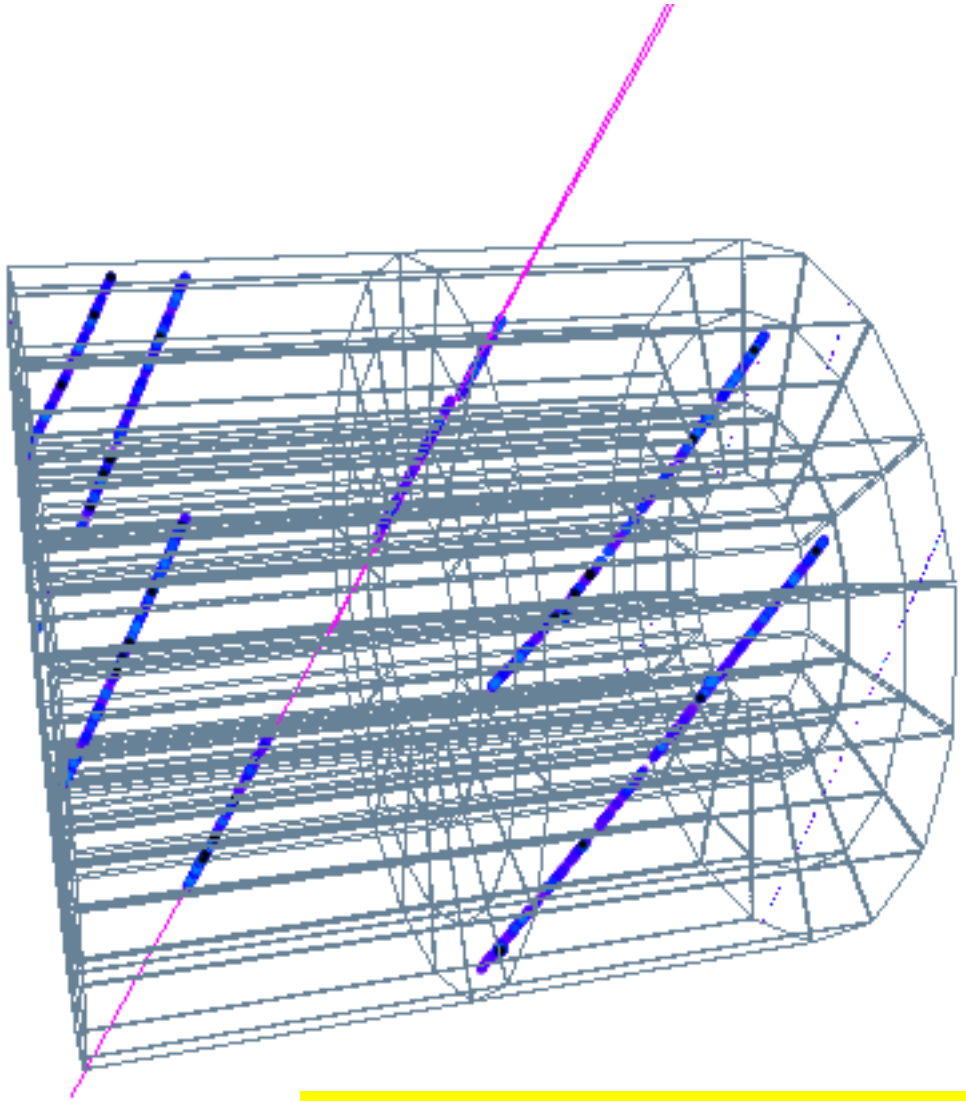
#muons reconstructed: 47 / 84 esd tracks
Some muon tracks are not reconstructed by the TPC

- MC



#muons reconstructed: 4 / 10 esd tracks
Some muon tracks are not reconstructed by the TPC.
In this case we should have 12 muons reconstructed

- MC



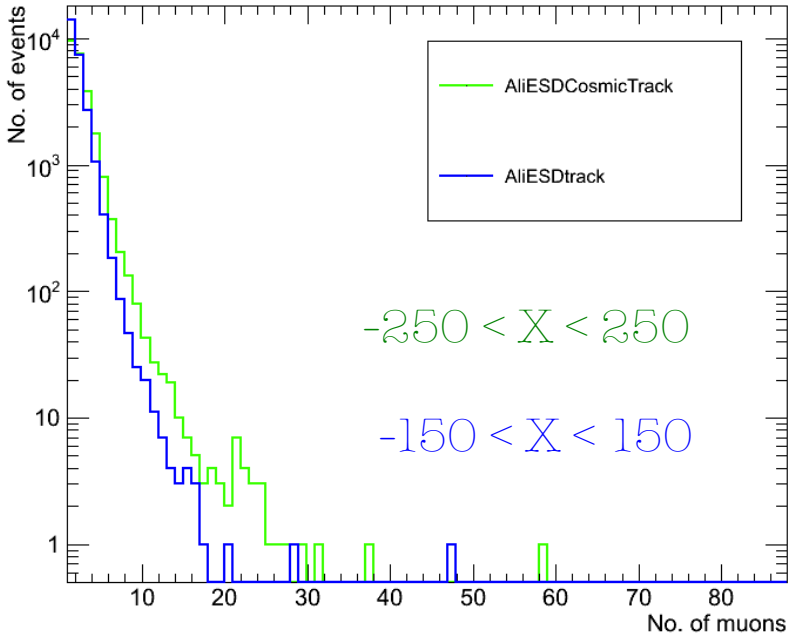
#muons reconstructed: 1 / 3 esd tracks
Some muon tracks are not reconstructed by the TPC.
In this case we should have 6 muons reconstructed

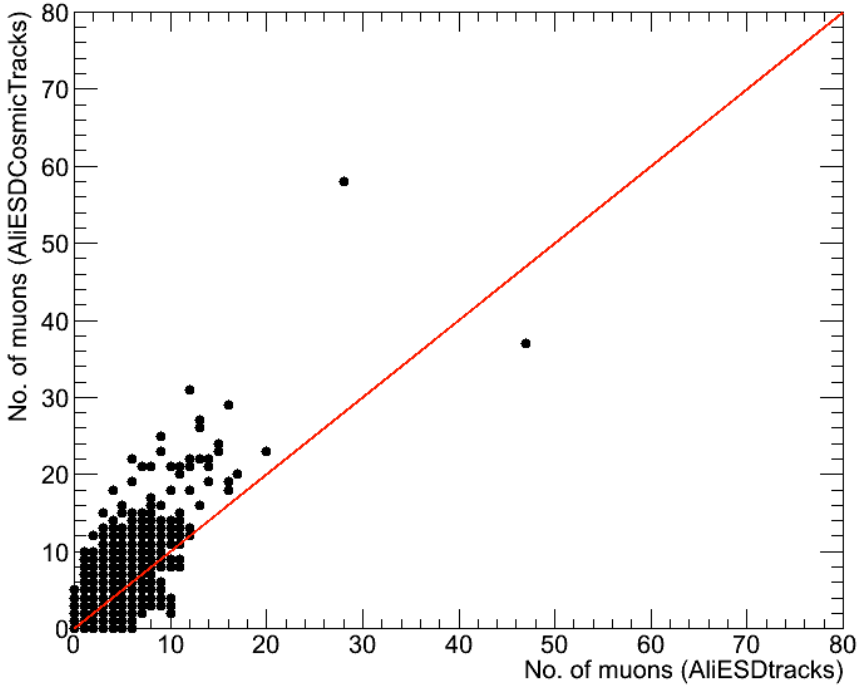
- MC

Since 2012, the AliESDs.root file also includes a branch for COSMIC TRACKS. We have two options for the analysis:

AliESDtracks → used for 2010, 2011, 2012 and 2013 data

AliESDCosmicTracks → used for Monte Carlo reconstructed



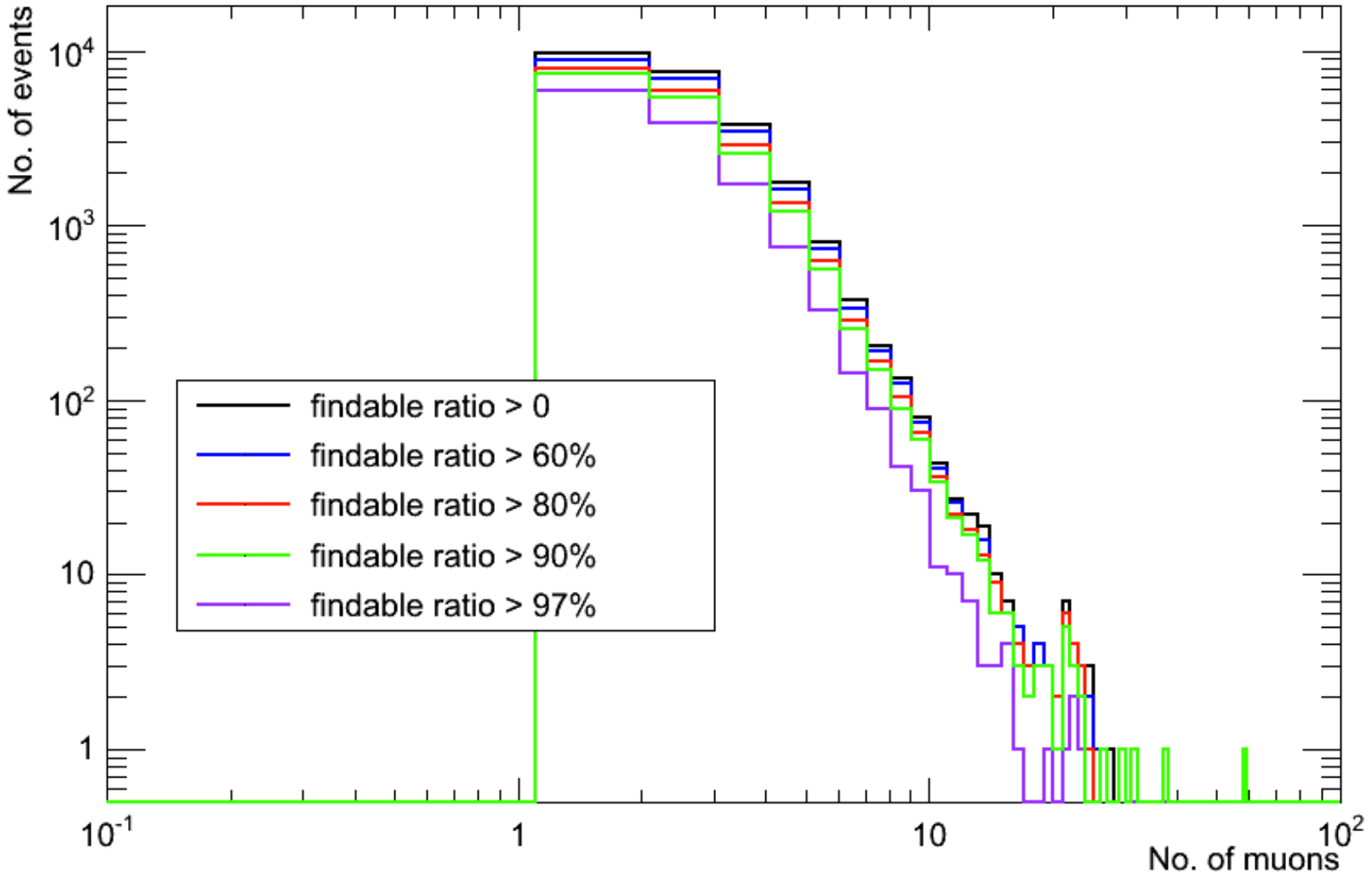


In the following slides, I always use AliESDCosmicTrack

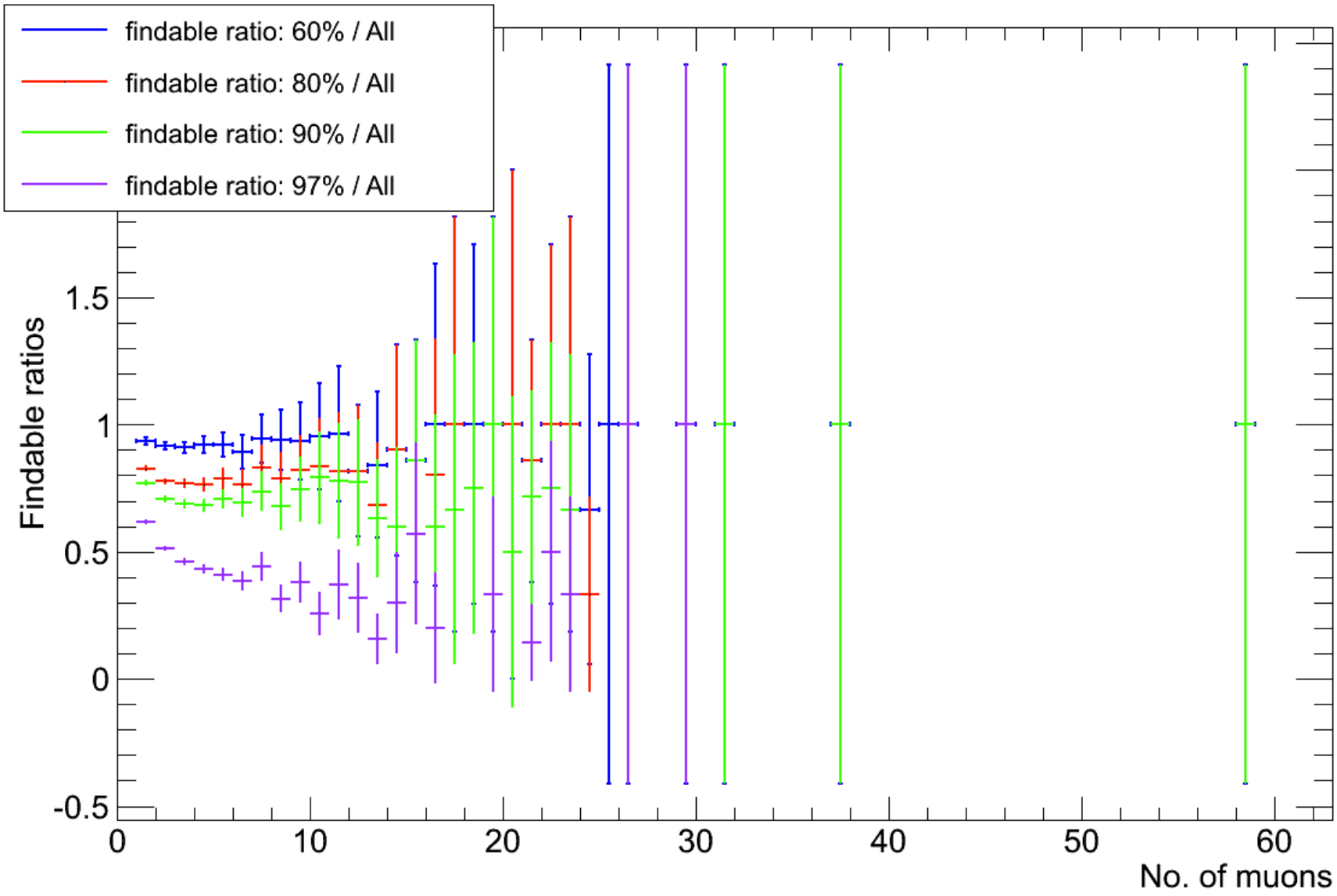
- MC

AliESDCosmicTracks → needed for MC data reconstructed.

Findable ratio = #reconstructed clusters / # findable clusters

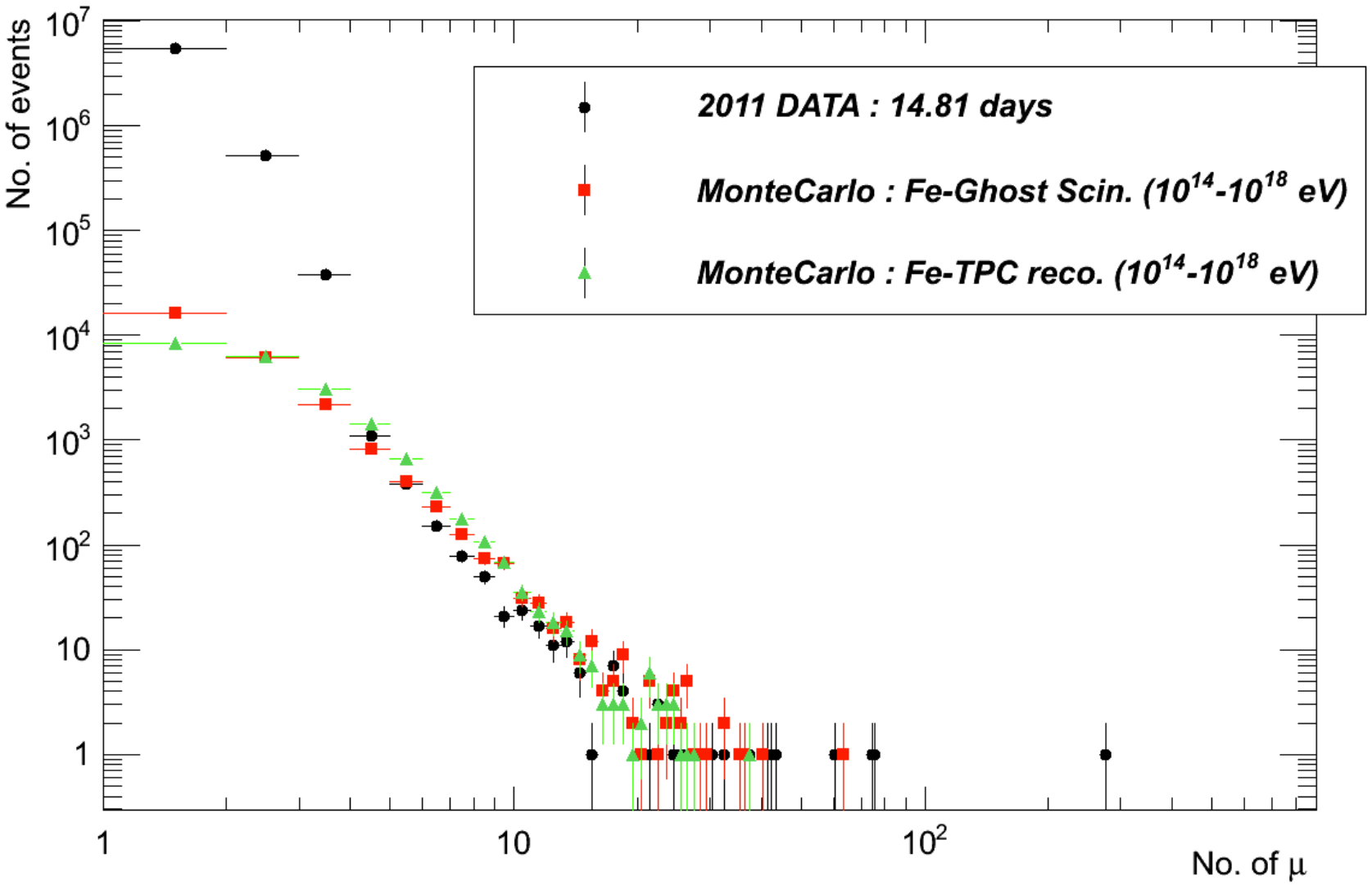


- MC


findable ratio: 60% / All
findable ratio: 80% / All
findable ratio: 90% / All
findable ratio: 97% / All
Findable ratios
1.5
1
0.5
0
-0.5
0
10
20
30
40
50
60
No. of muons

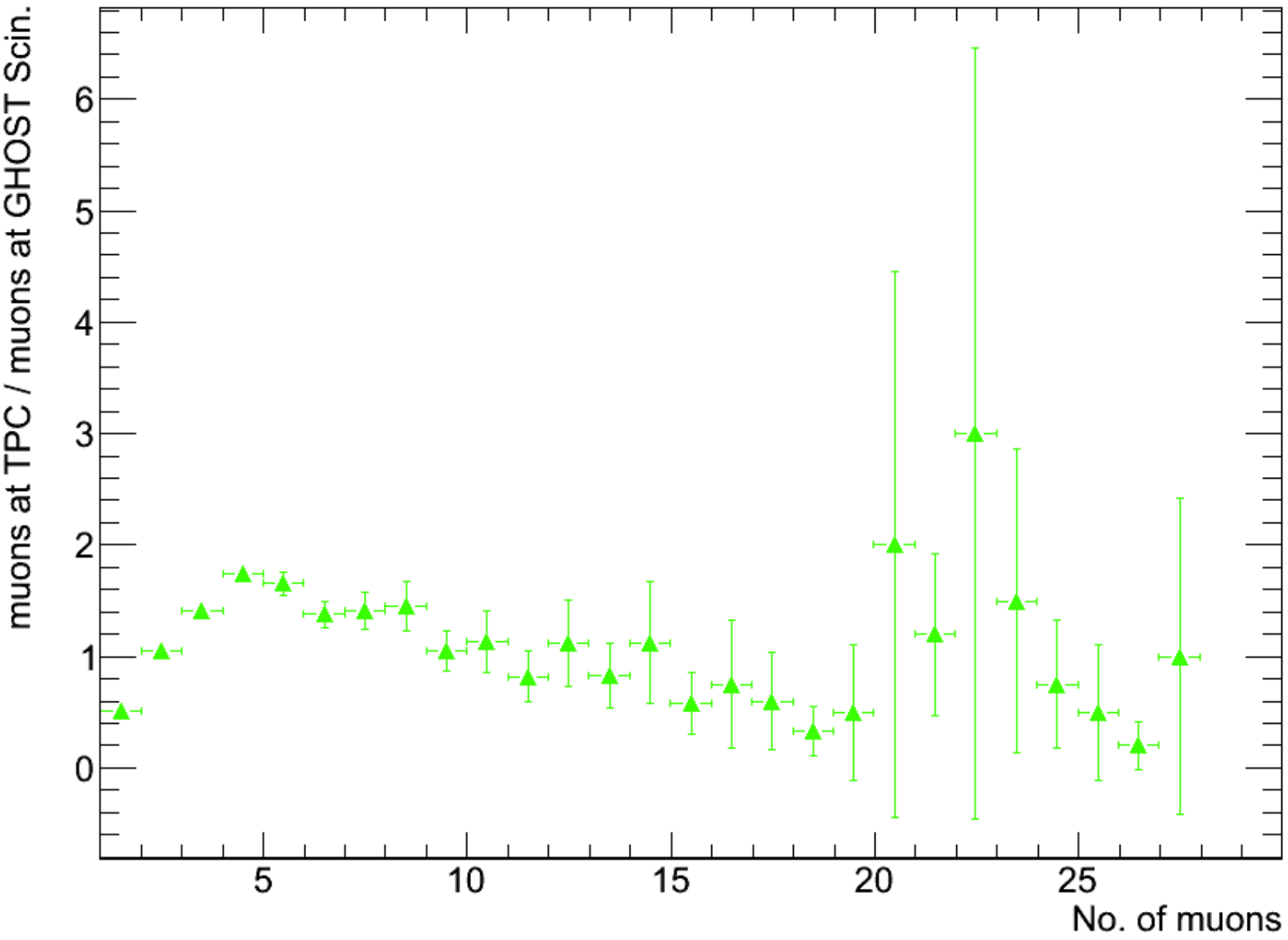
- MC/Data sample

No cut on findableRatio



- MC/Data sample

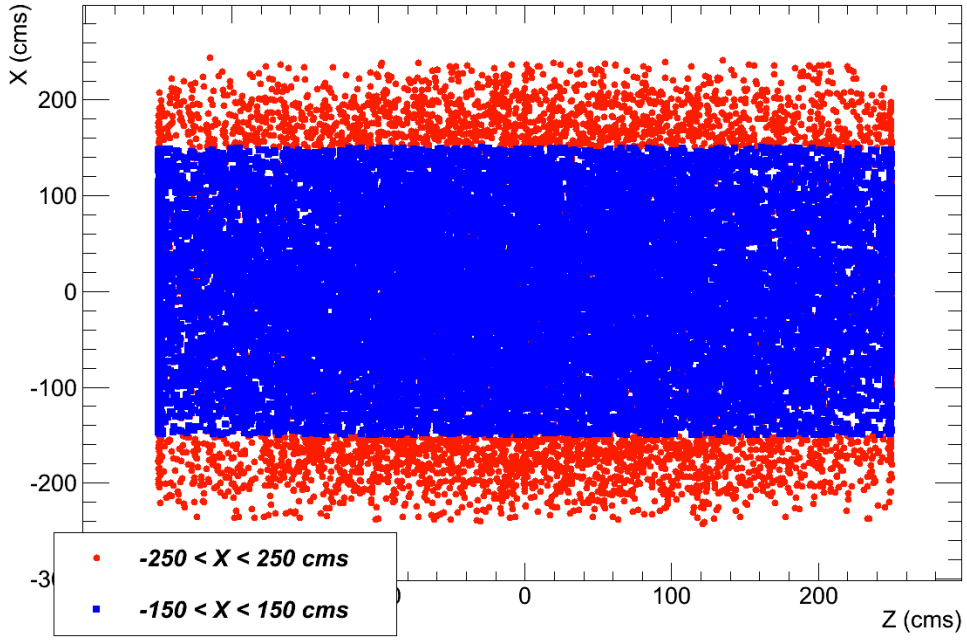
No cut on findableRatio



- MC

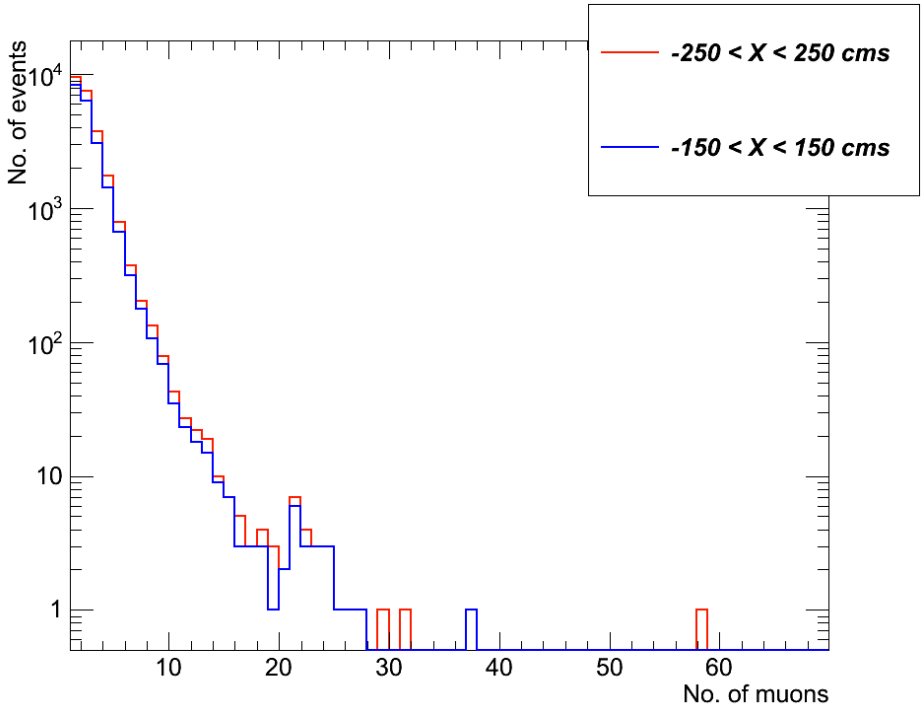
Why in the TPC we see more events than in the GHOST SCINTILLATOR?

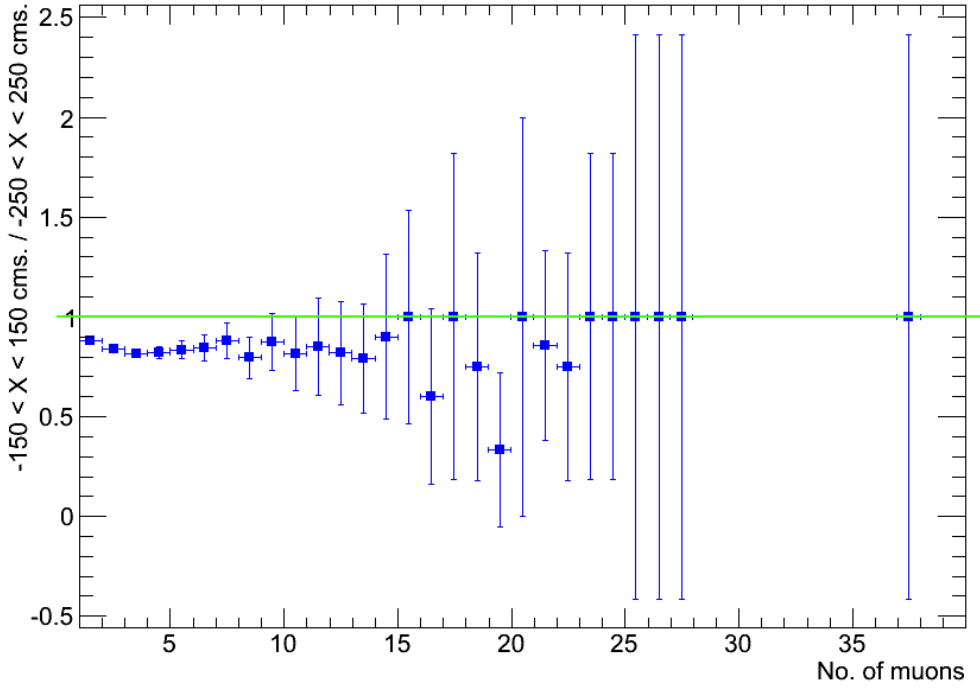
- The CosmicTracker was used during the reconstruction of Monte Carlo (AliRecoParam::kCosmic)
- AliESDCosmicTrack X-range: -250 < X < 250 cms
- AliESDtrack X-range: -150 < X < 150 cms.



- MC

Why in the TPC we see more events than in the GHOST SCINTILLATOR?

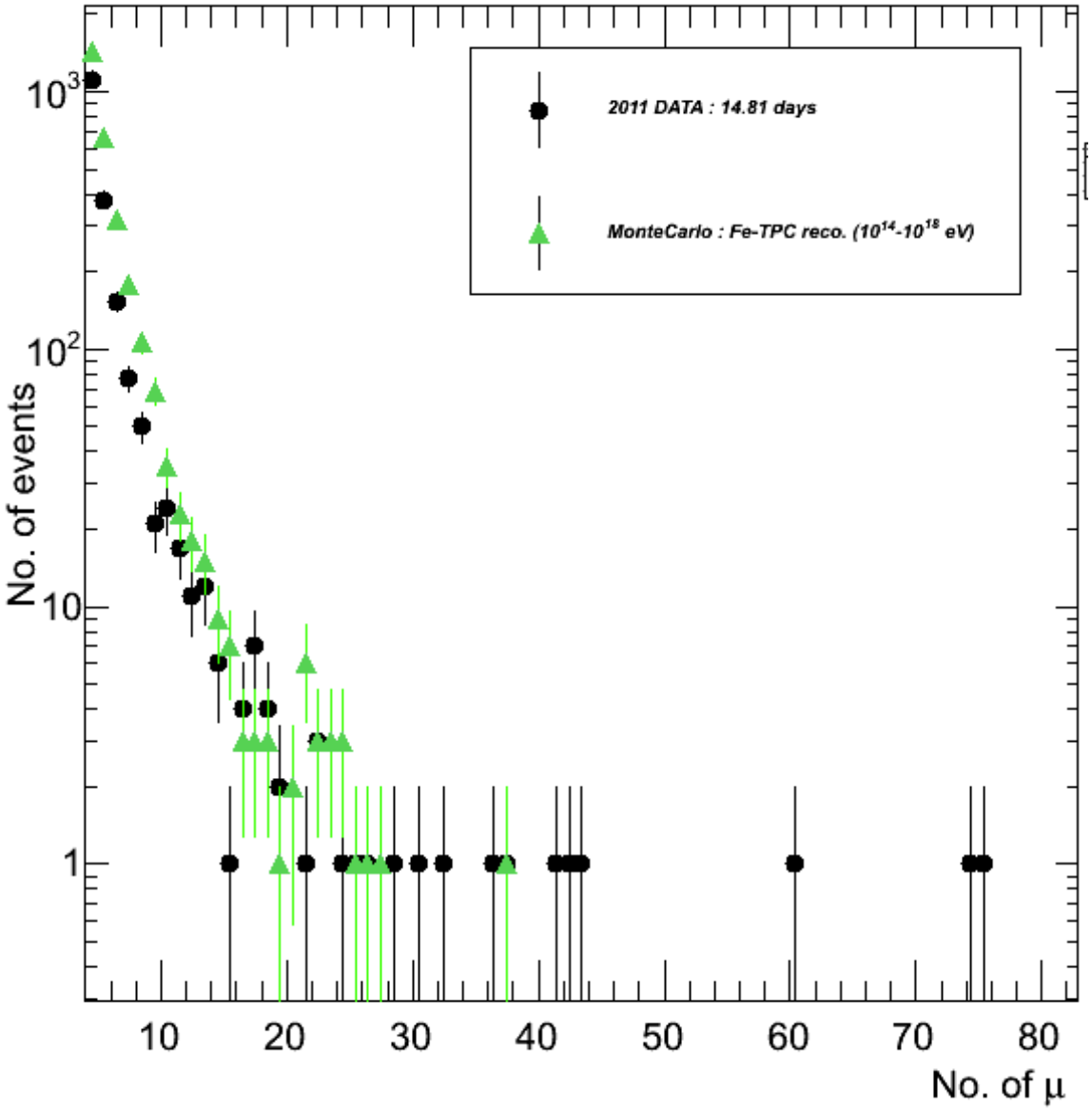




- To use the same condition as in data, we will use -150 < X < 150 cms. for the Monte Carlo reconstructed.

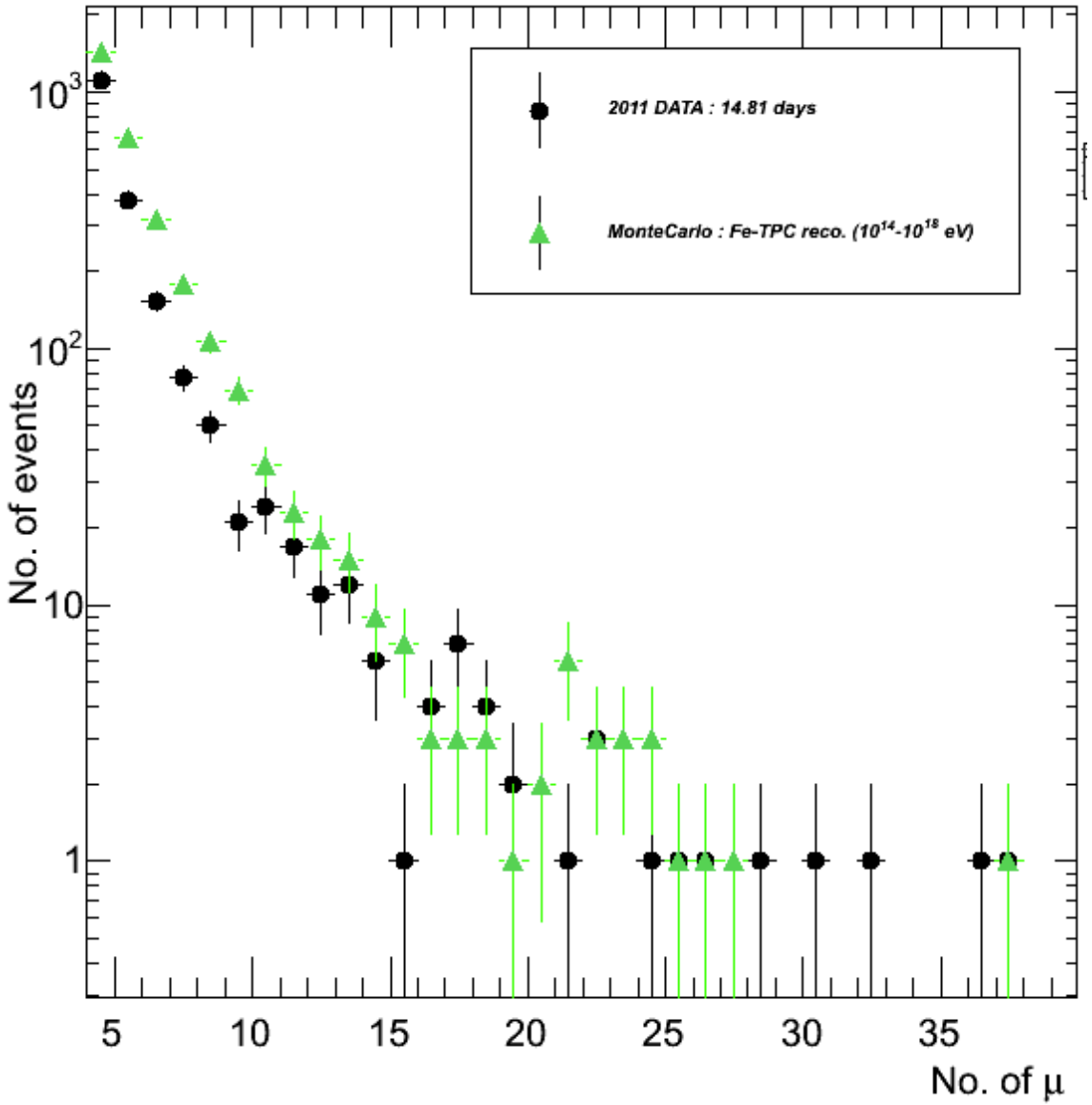
- MC/Data sample

For approval ??



- MC/Data sample

For approval ??

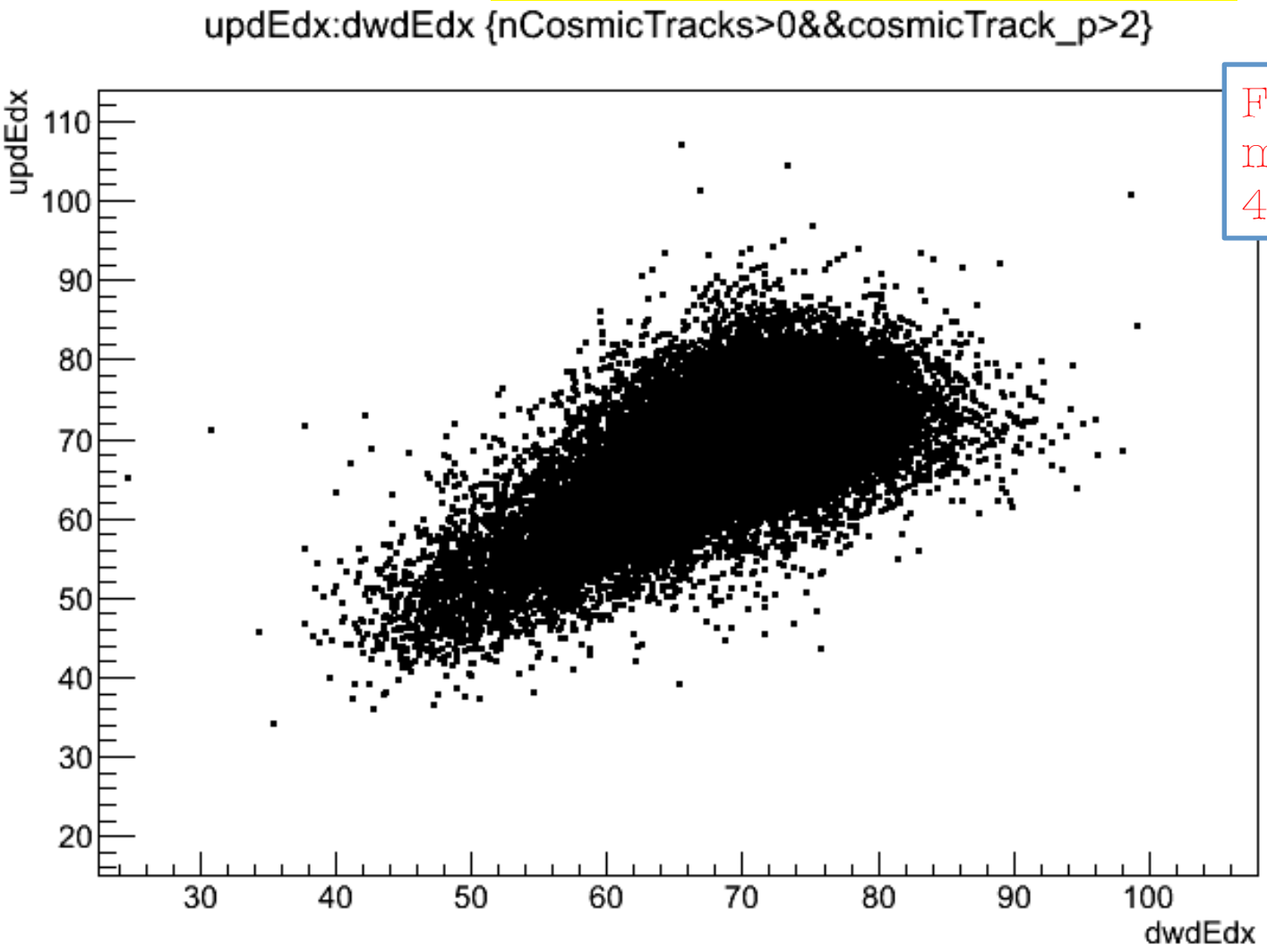


Same plot as in slide 12 but in a different range as the perfomance plot of 2011

The green points were obtained with the CosmicTracker → to be confirmed with our matching algorithm

- MC

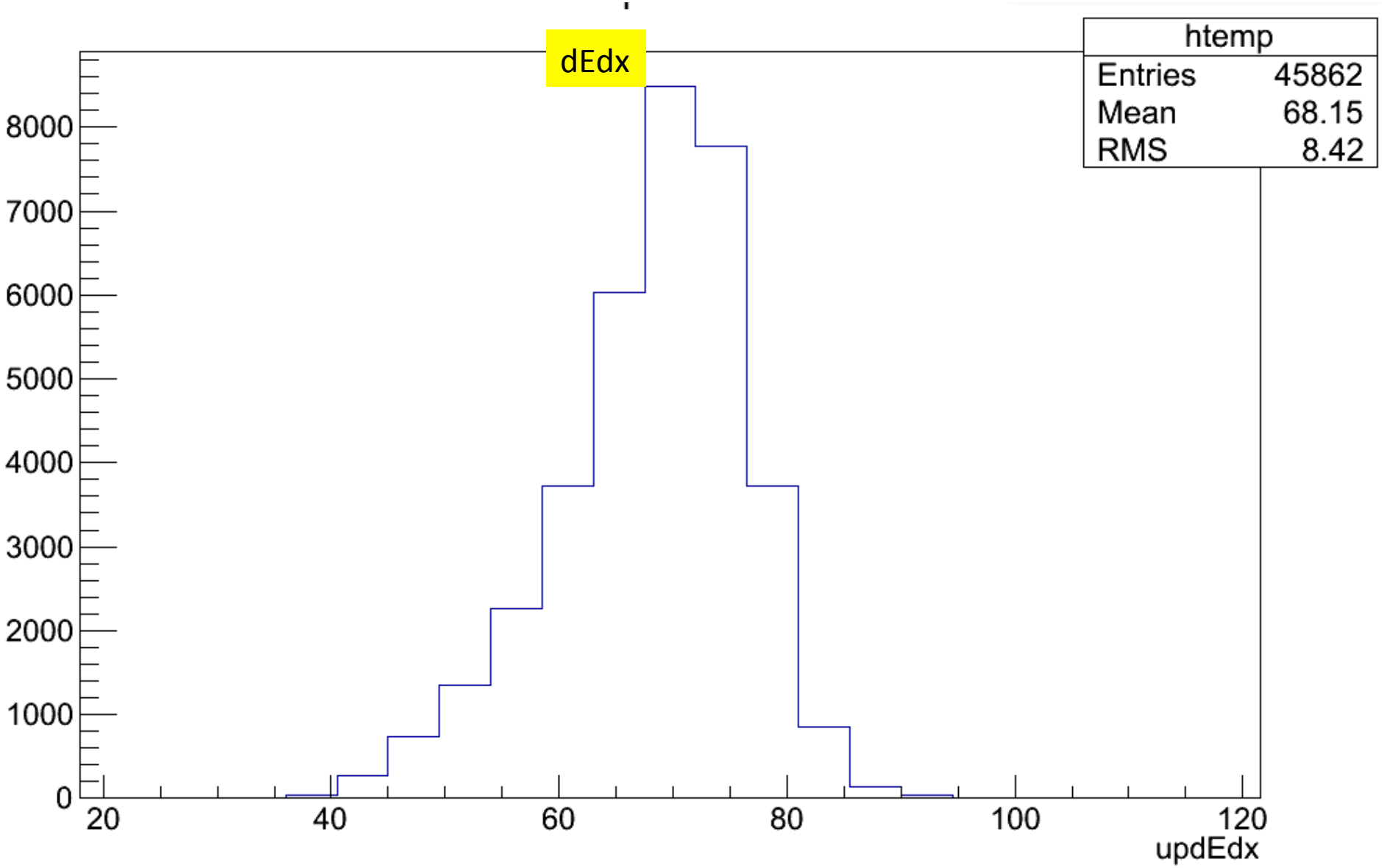
Monte Carlo reconstructed with the TPC



For atmospheric muons:
40 < dE/dx < 90

Monte Carlo reconstructed with the TPC

- MC



- MC

There are discrepancies in the reconstruction between the different modes of reconstruction (AliRecoParam::kCosmics, kHighMult, kLowMult and default)

To understand how is the TPC reconstructing the raw data, I used 5 events with the different modes of reconstruction and compare each one with the raw data (with AliEve).

- MC: kCosmics

No. of event	No. of muons (GHOST Scin. 6x6 m^2)	No. of ESD tracks	No. of reconstructed muons (from AliESDtrack)	No. of AliESDCosmicTracks
1	1	0	0	0
2	6	5	2	1
3	23	14	7	10
4	2	2	1	1
5	31	5	2	8

- MC: kHighMult

No. of event	No. of muons (GHOST Scin. 6x6 m^2)	No. of ESD tracks	No. of reconstructed muons (from AliESDtrack)	No. of AliESDCosmicTracks
1	1	0	0	0
2	5	6	3	1
3	25	18	9	11
4	2	2	1	1
5	31	16	8	10

- MC: kLowMult

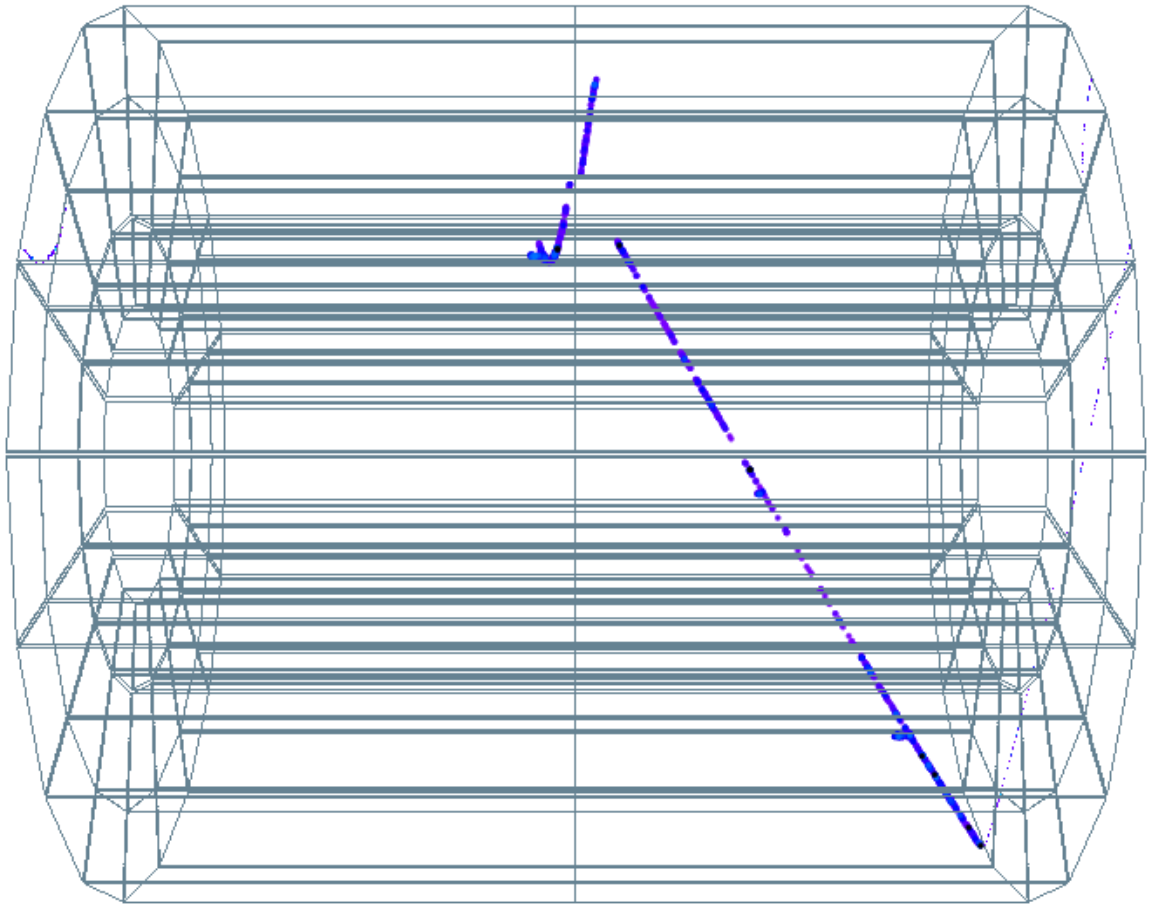
No. of event	No. of muons (GHOST Scin. 6x6 m^2)	No. of ESD tracks	No. of reconstructed muons (from AliESDtrack)	No. of AliESDCosmicTracks
1	3	3	1	1
2	5	1	0	1
3	25	14	7	10
4	2	2	1	1
5	33	16	8	8

- MC: noEventSpecies

No. of event	No. of muons (GHOST Scin. 6x6 m^2)	No. of ESD tracks	No. of reconstructed muons (from AliESDtrack)	No. of AliESDCosmicTracks
1	3	4	2	1
2	7	4	2	2
3	24	21	10	10
4	2	2	1	1
5	32	10	5	7

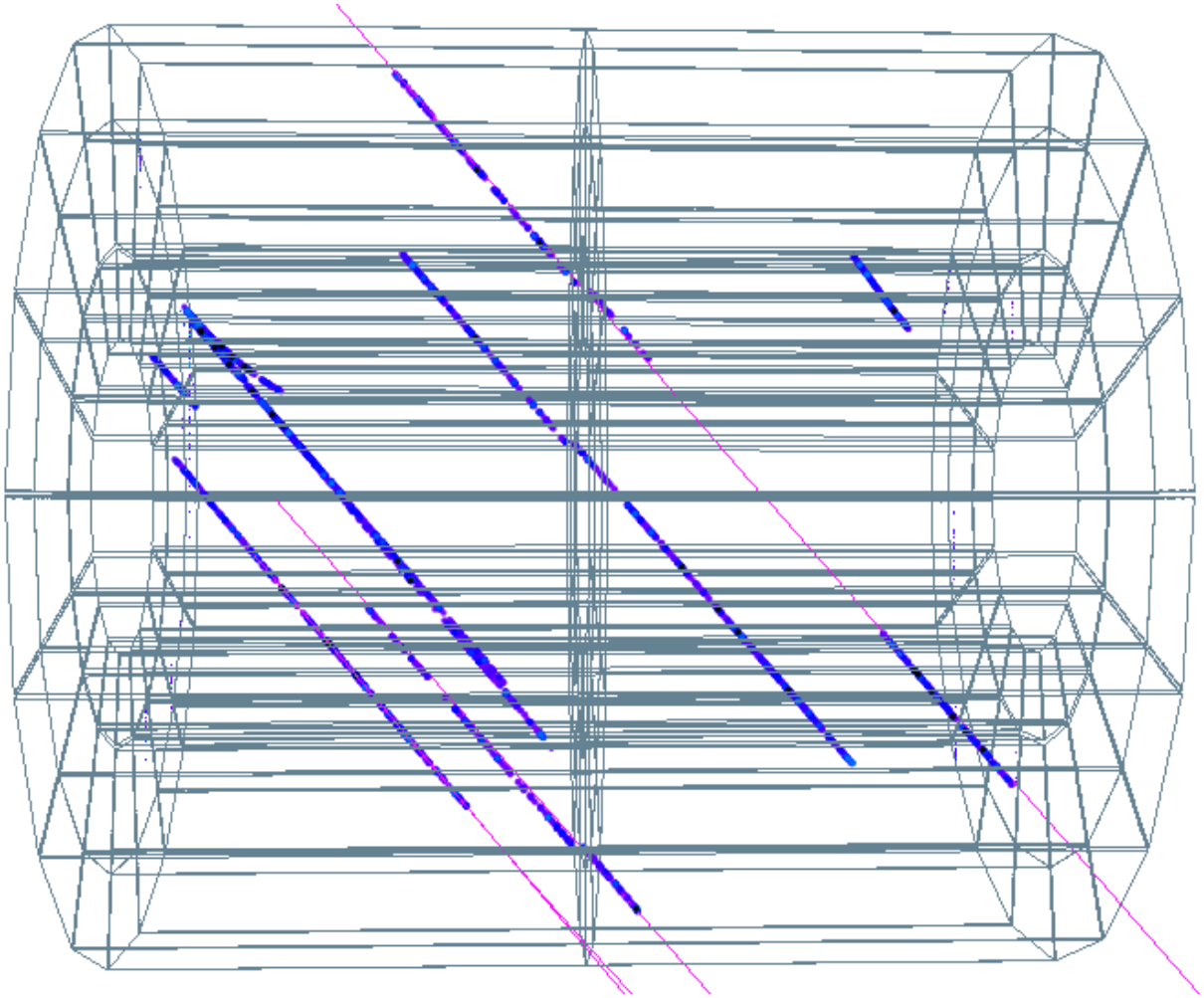
- MC: kCosmics

event: 0 eventInFile: 0 ntracks: 0 muons_esd: 0 ncosmictracks: 0



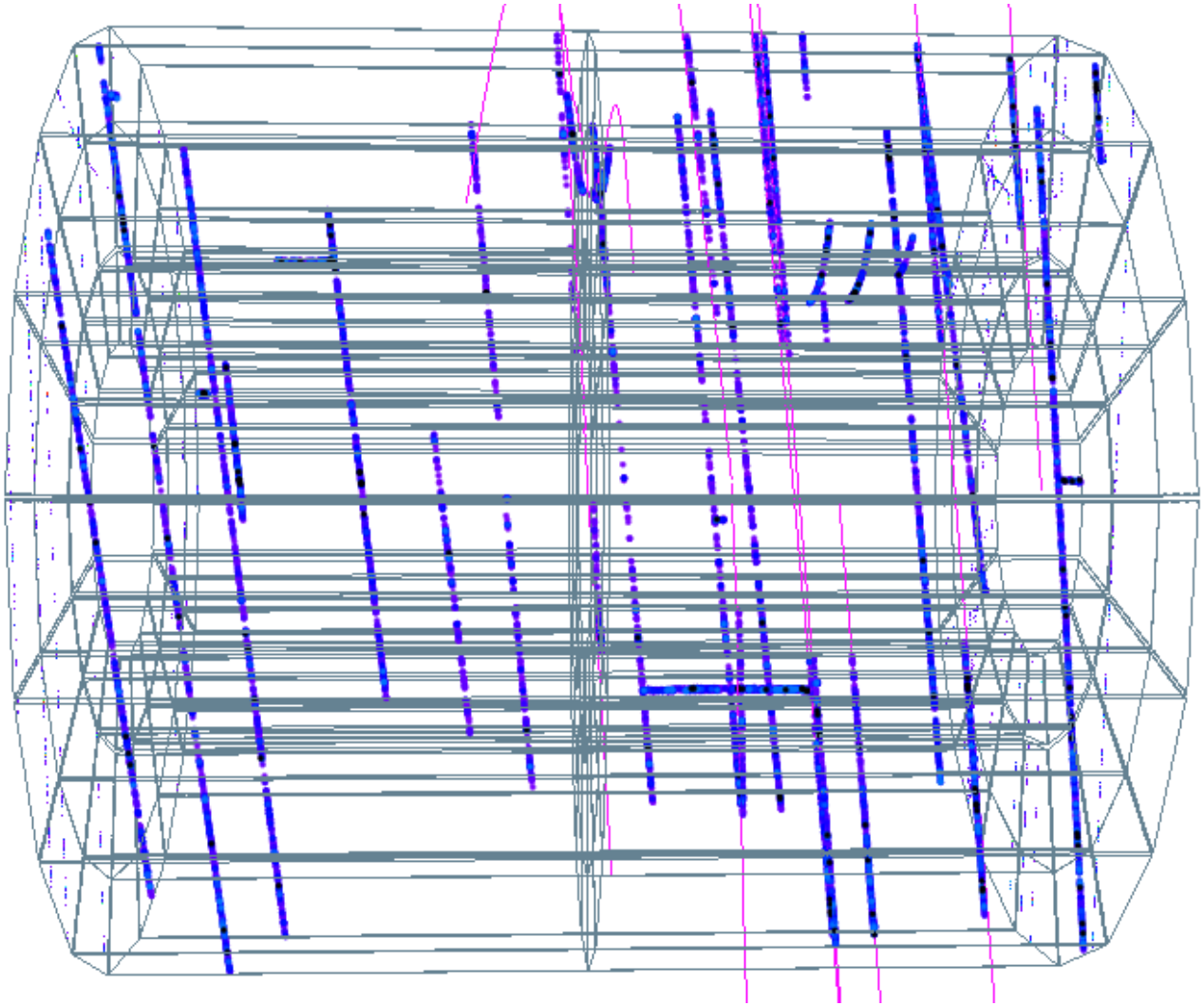
- MC: kCosmics

event: 1 eventInFile: 1 ntracks: 5 muons_esd: 2 ncosmictracks: 1



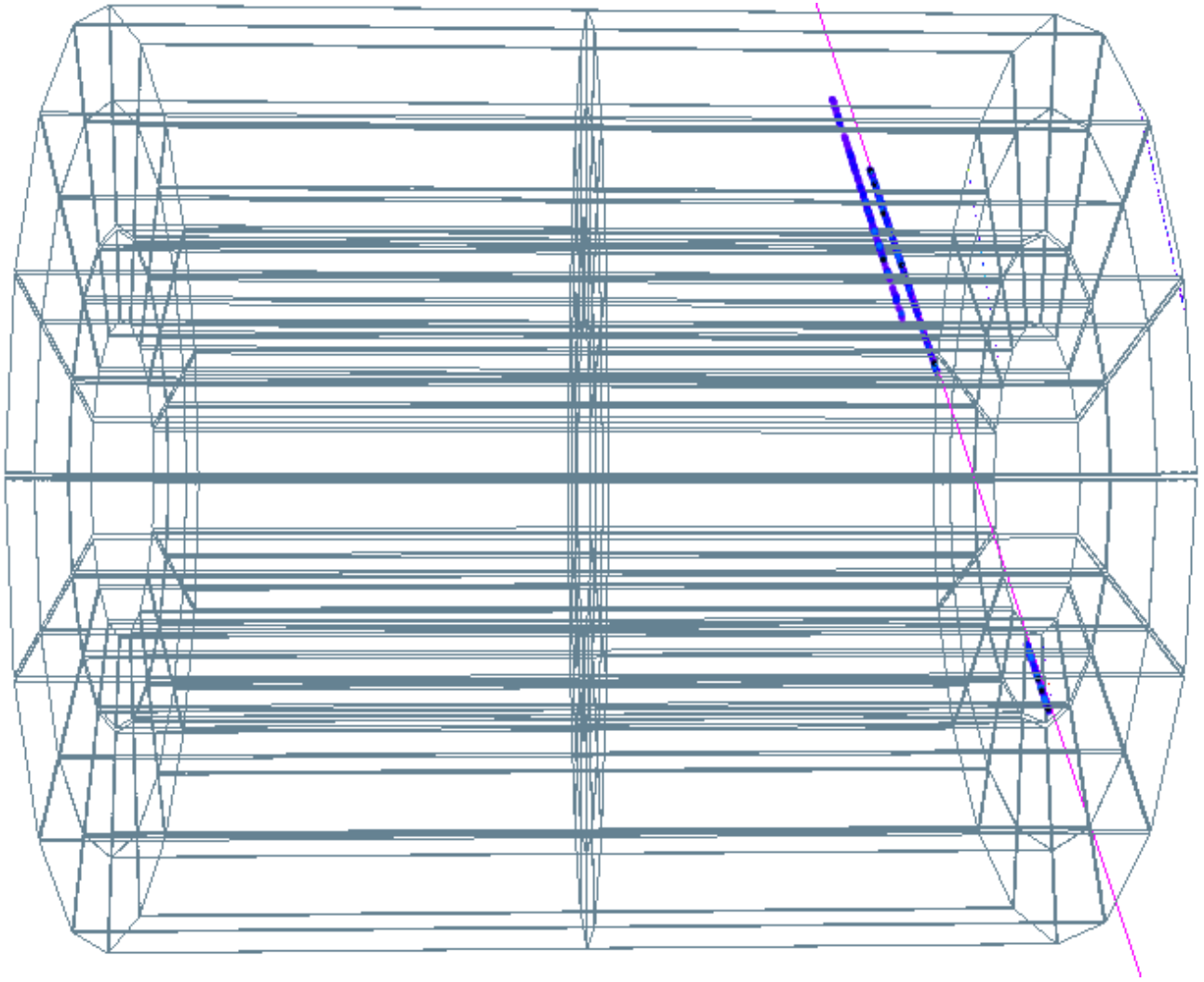
- MC: kCosmics

event: 2 eventInFile: 2 ntracks: 14 muons_esd: 7 ncosmictracks: 10



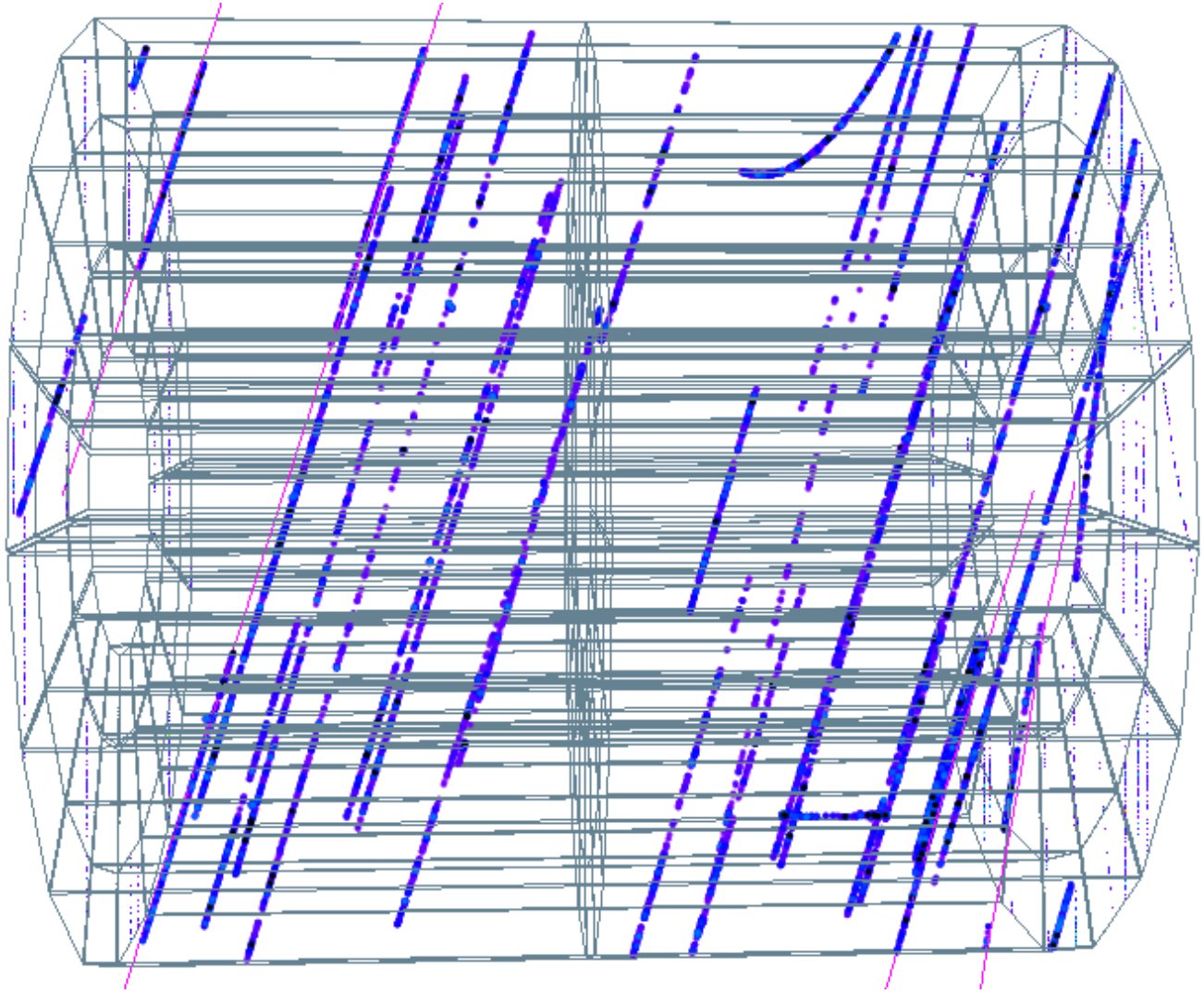
- MC: kCosmics

event: 3 eventInFile: 3 ntracks: 2 muons_esd: 1 ncosmictracks: 1



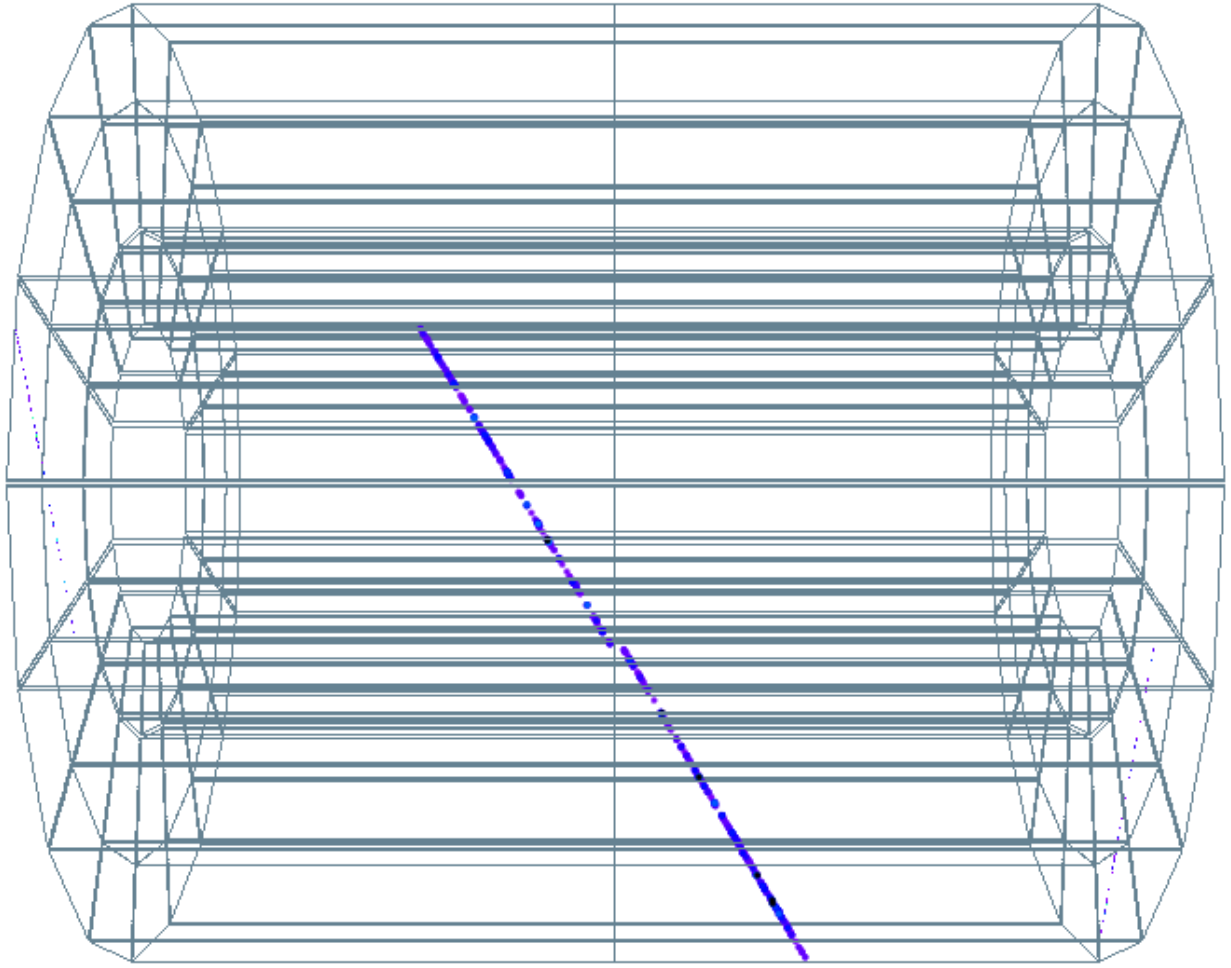
- MC: kCosmics

event: 4 eventInFile: 4 ntracks: 5 muons_esd: 2 ncosmictracks: 8



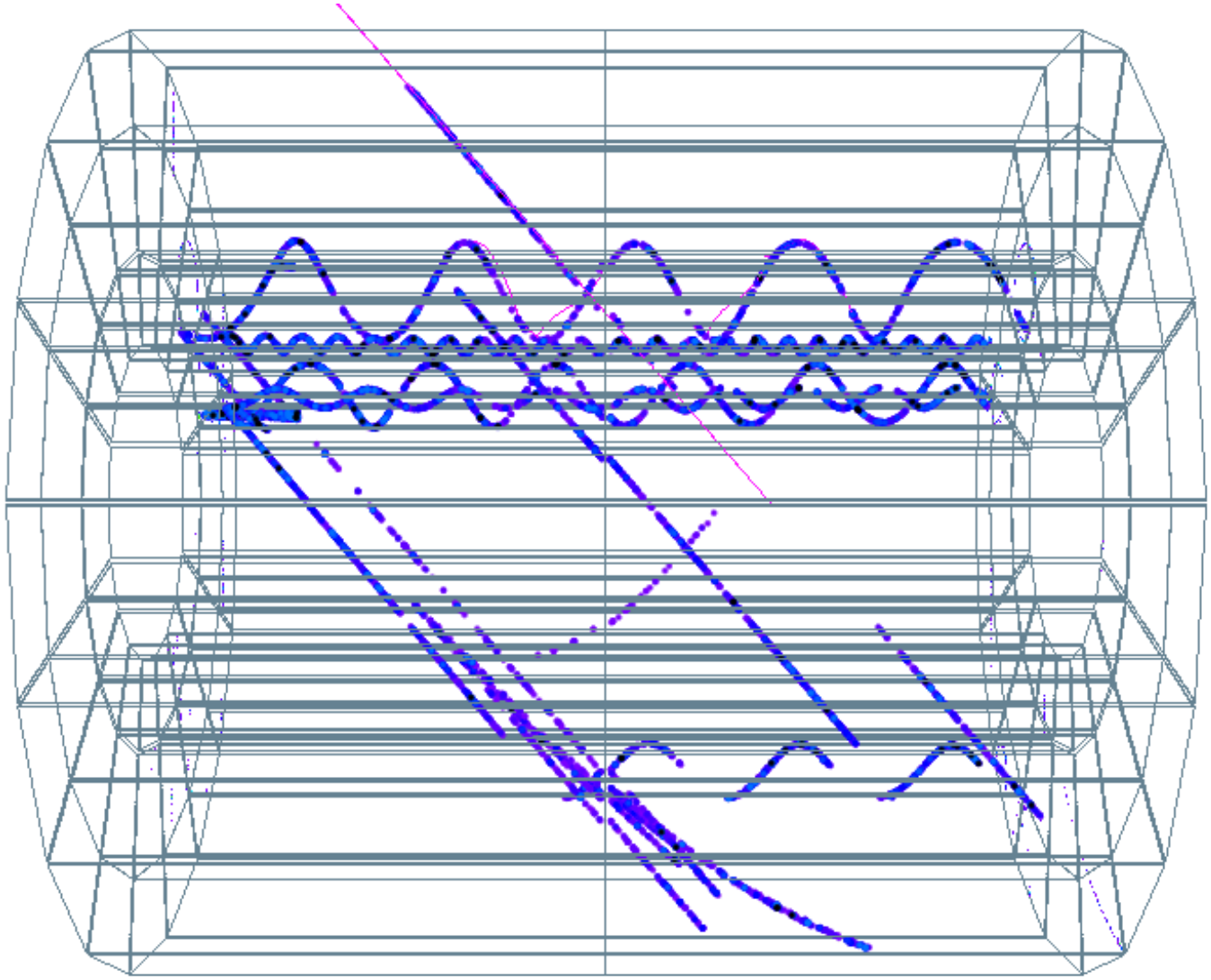
- MC: kHighMult

event: 0 eventInFile: 0 ntracks: 0 muons_esd: 0 ncosmictracks: 0



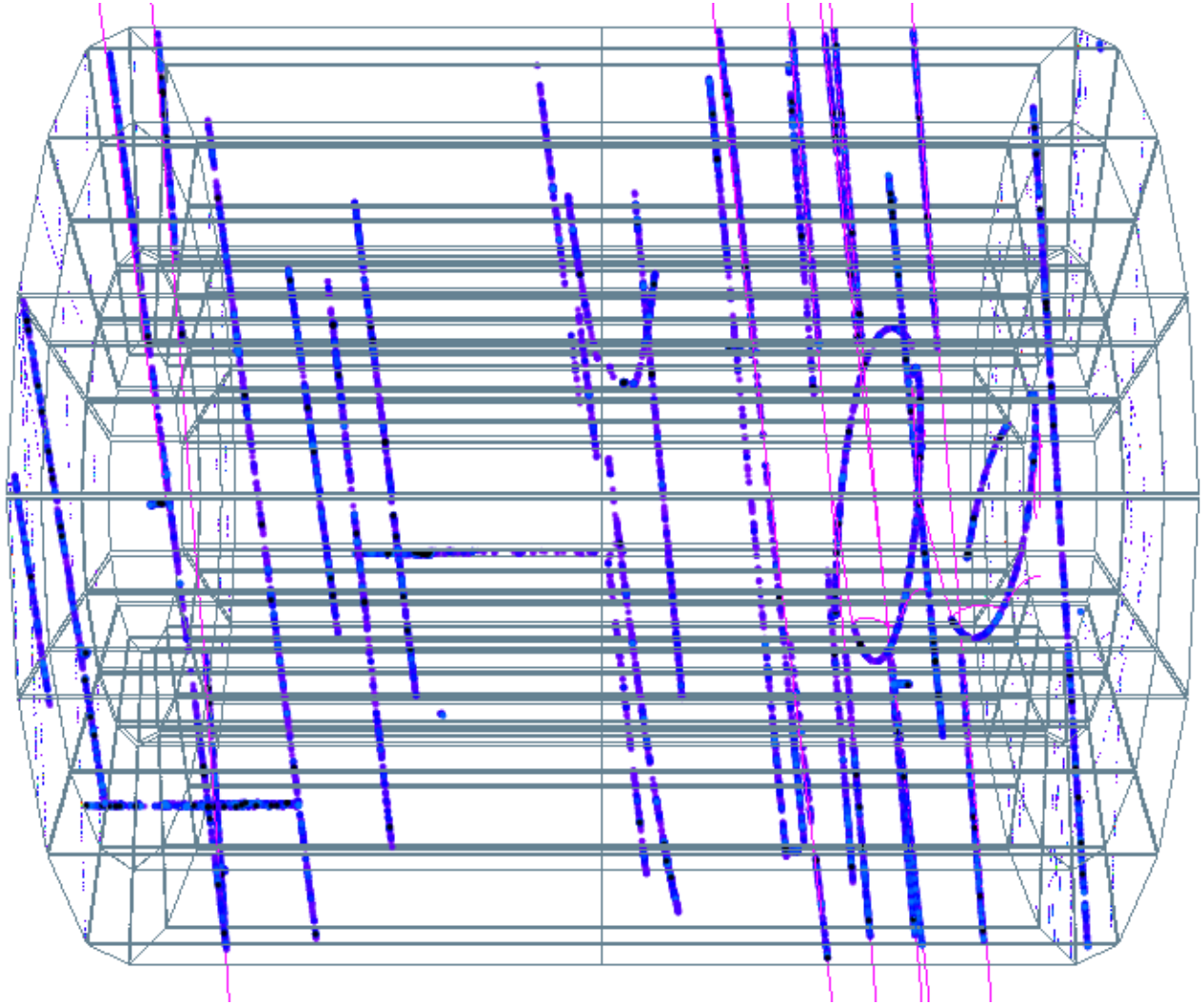
- MC: kHighMult

event: 1 eventInFile: 1 ntracks: 6 muons_esd: 3 ncosmictracks: 1



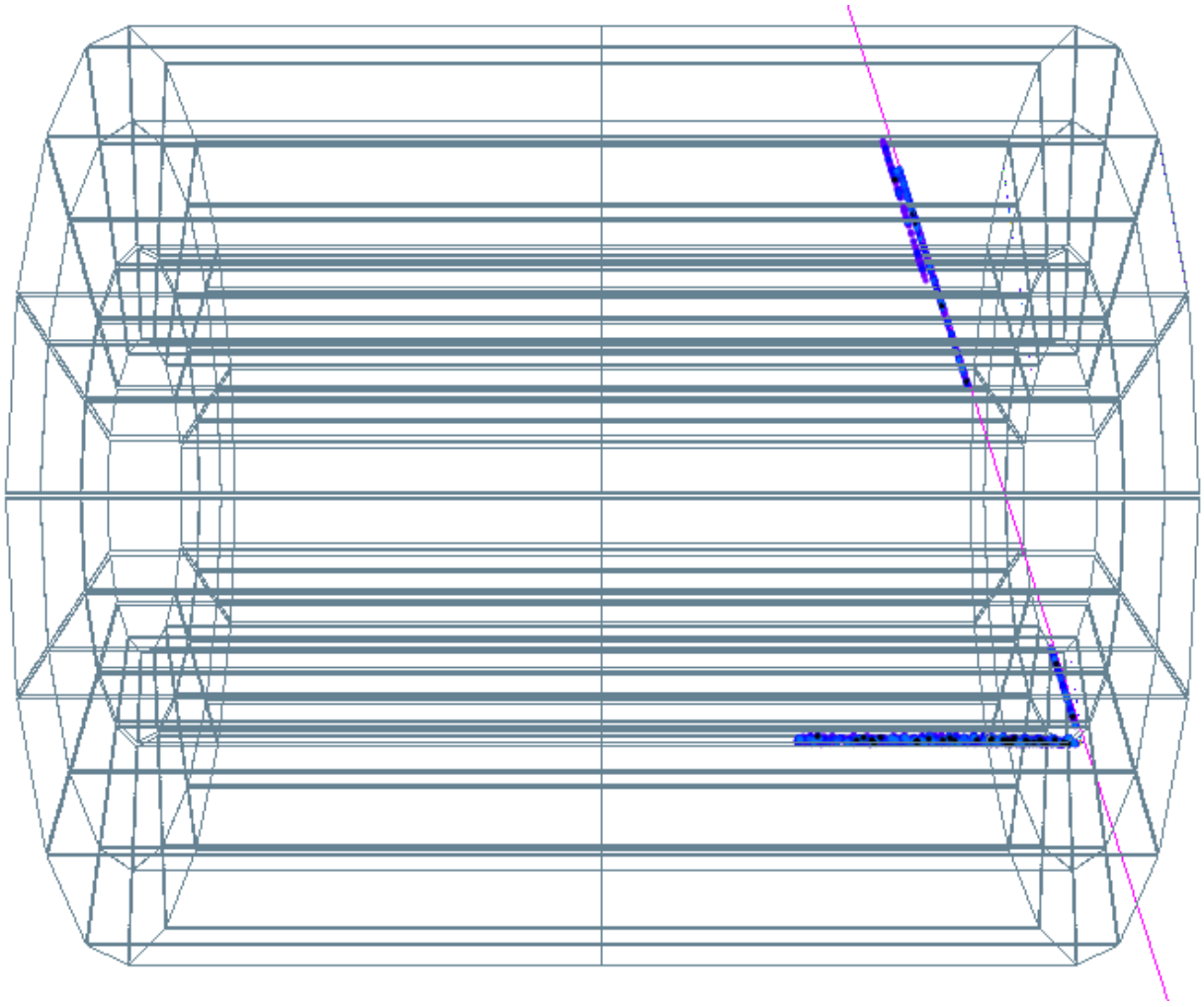
- MC: kHighMult

event: 2 eventInFile: 2 ntracks: 18 muons_esd: 9 ncosmictracks: 11



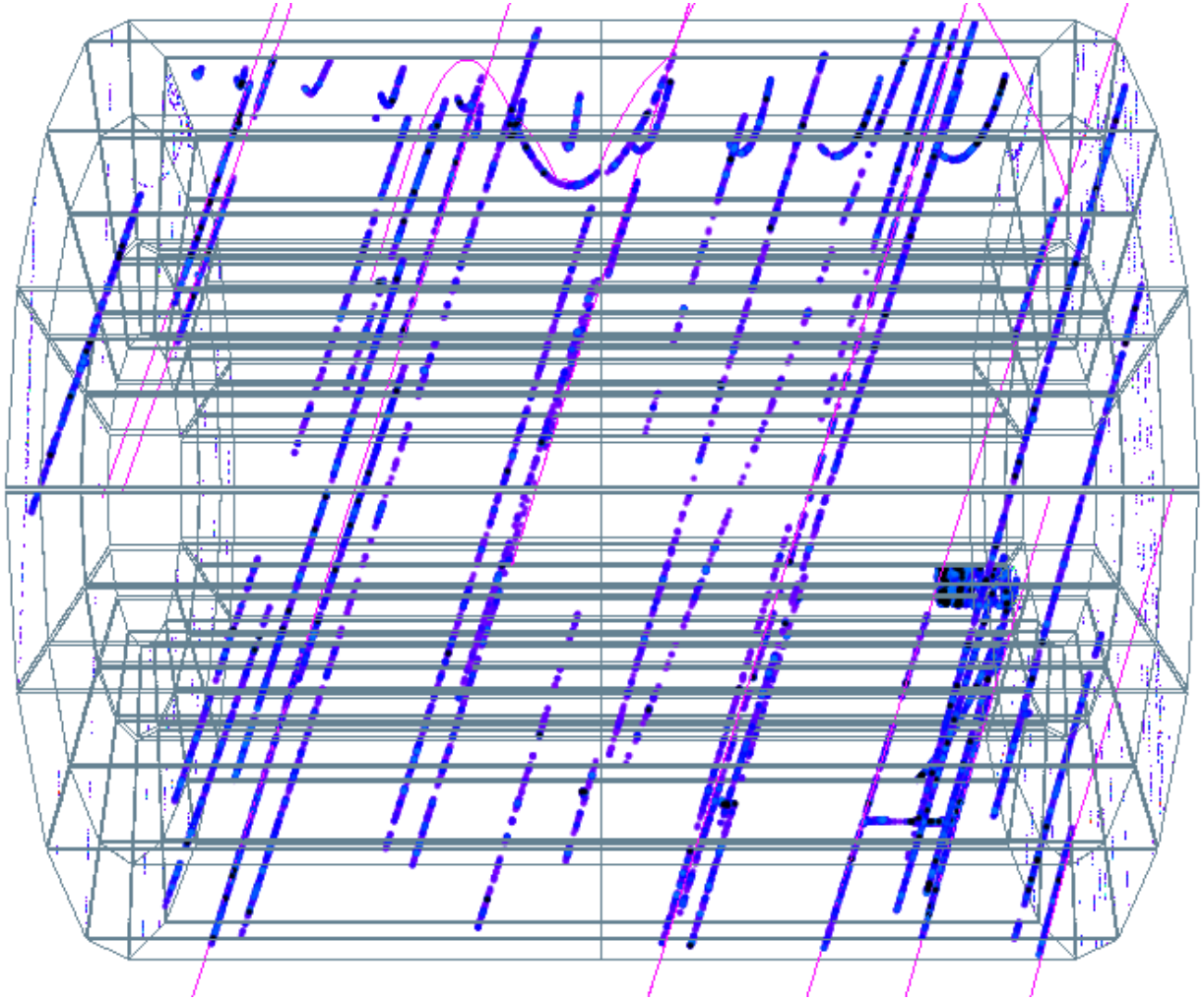
- MC: kHighMult

event: 3 eventInFile: 3 ntracks: 2 muons_esd: 1 ncosmictracks: 1



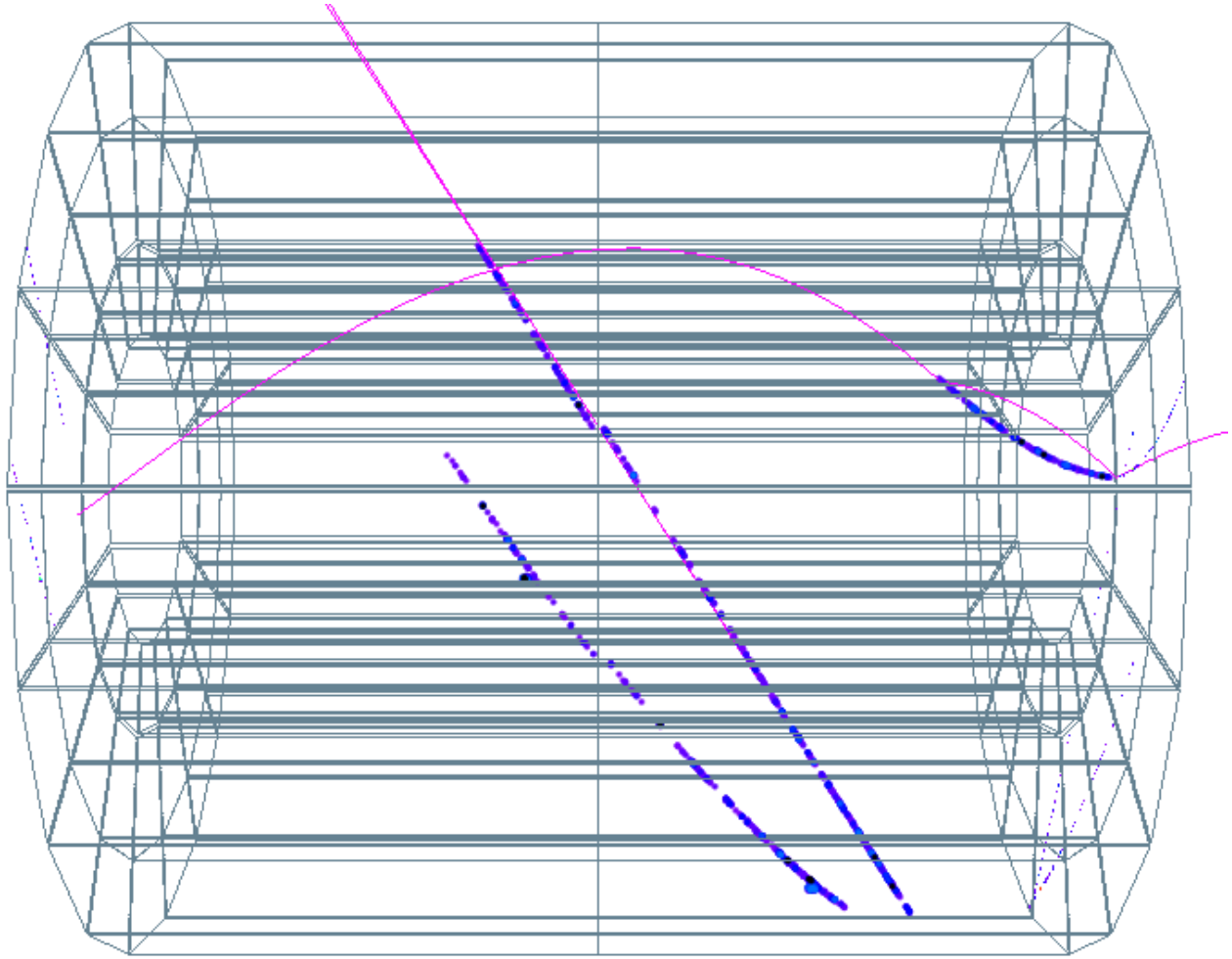
- MC: kHighMult

event: 4 eventInFile: 4 ntracks: 16 muons_esd: 8 ncosmictracks: 10



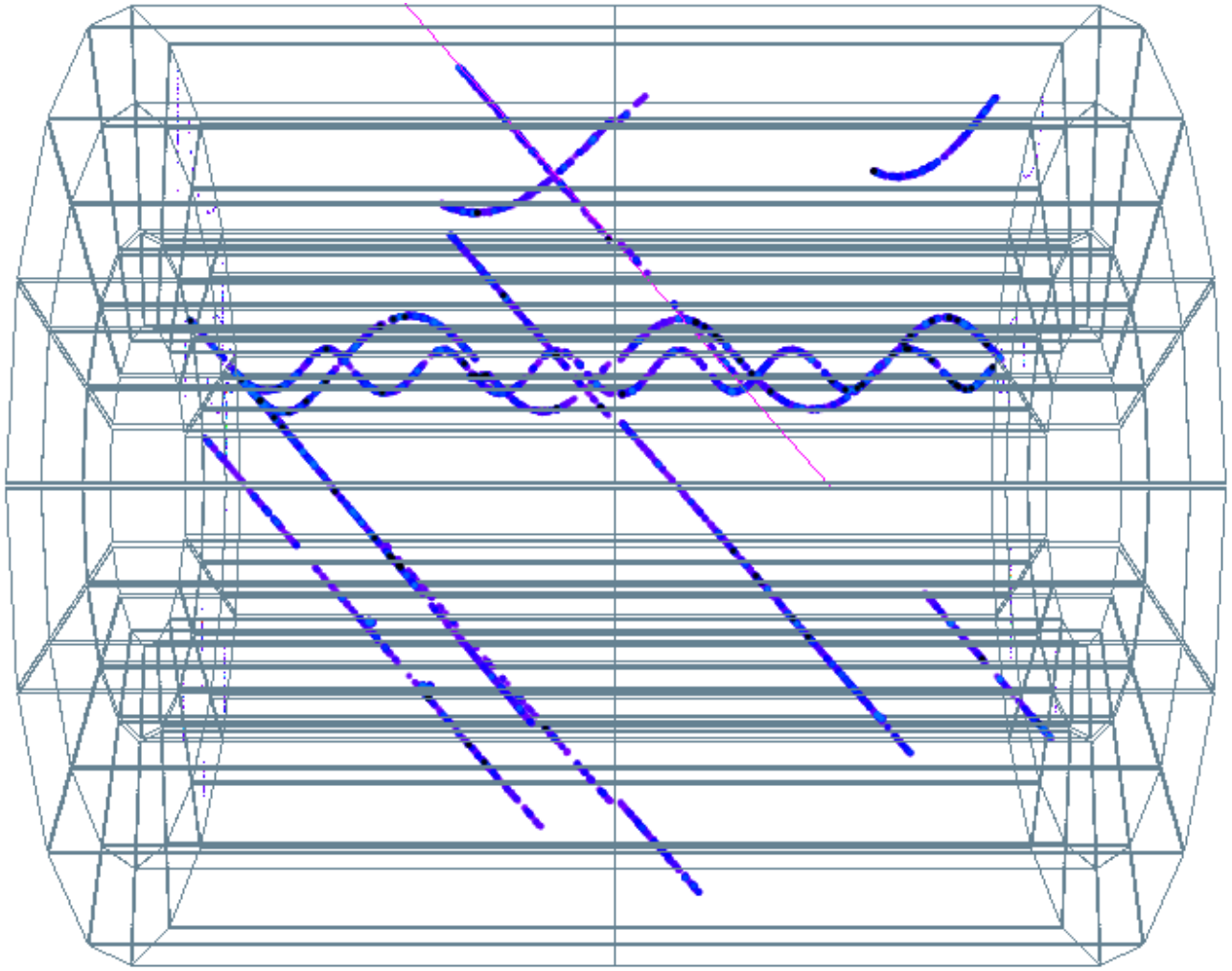
- MC: kLowMult

event: 0 eventInFile: 0 ntracks: 3 muons_esd: 1 ncosmictracks: 1



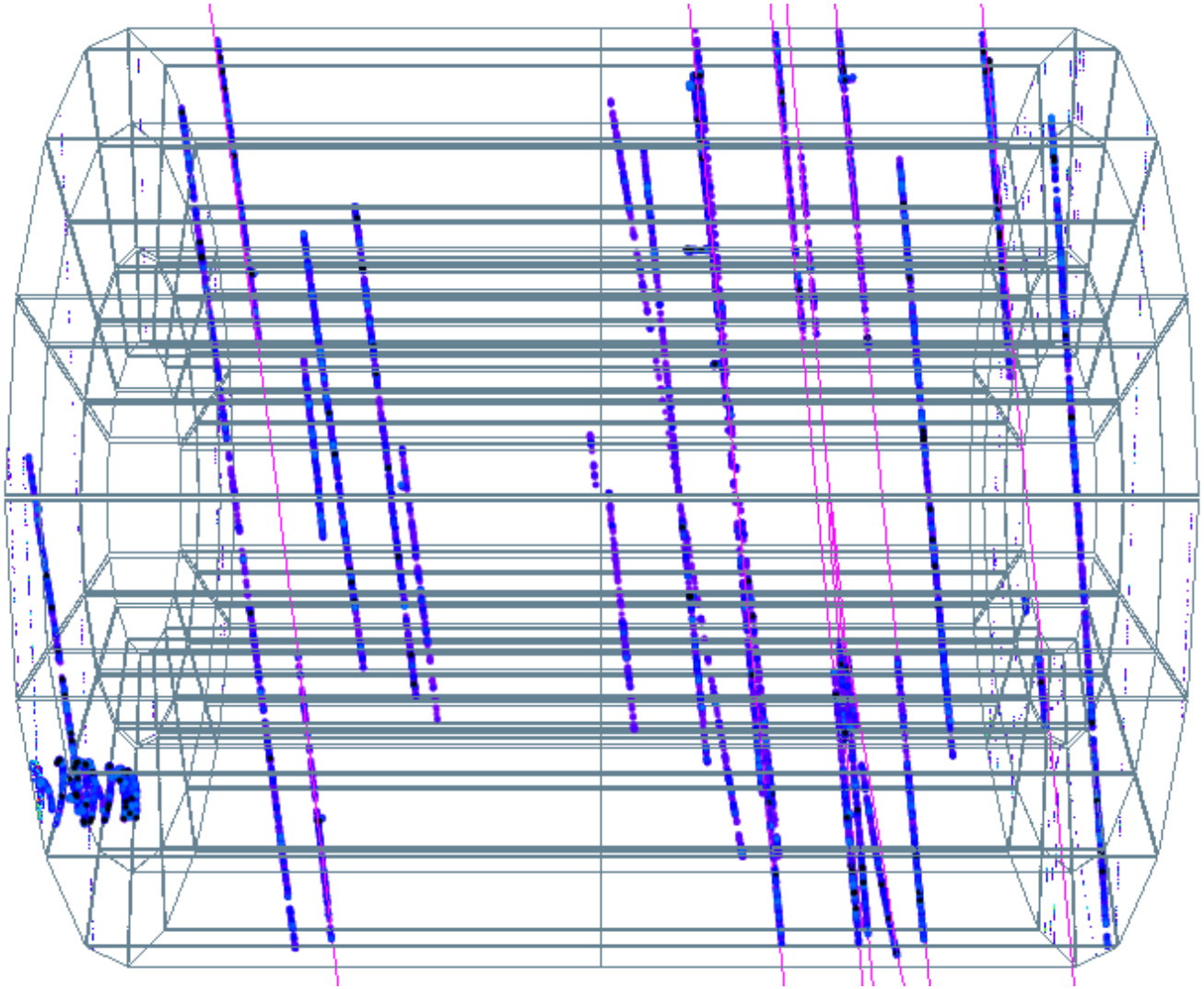
- MC: kLowMult

event: 1 eventInFile: 1 ntracks: 1 muons_esd: 0 ncosmictracks: 1



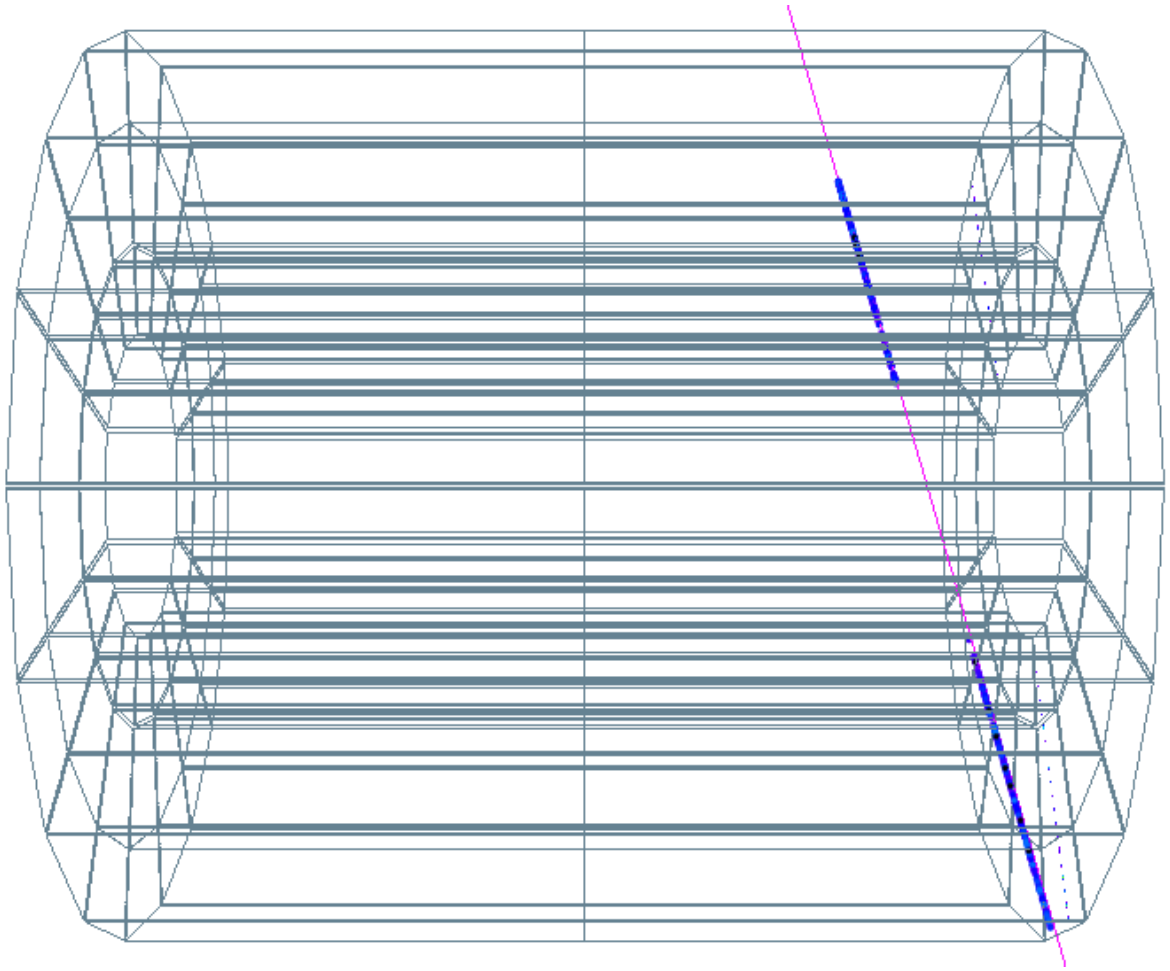
- MC: kLowMult

event: 2 eventInFile: 2 ntracks: 14 muons_esd: 7 ncosmictracks: 10



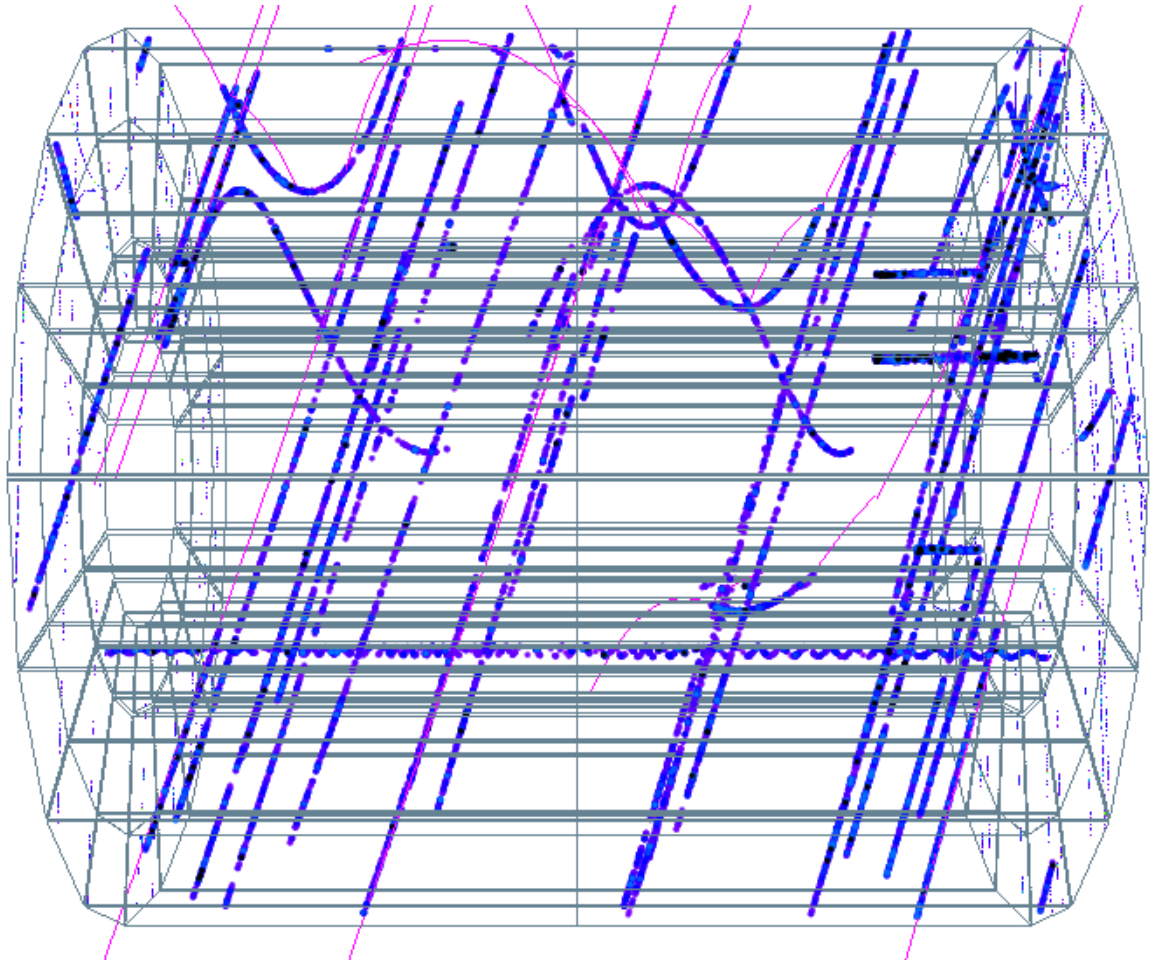
- MC: kLowMult

event: 3 eventInFile: 3 ntracks: 2 muons_esd: 1 ncosmictracks: 1



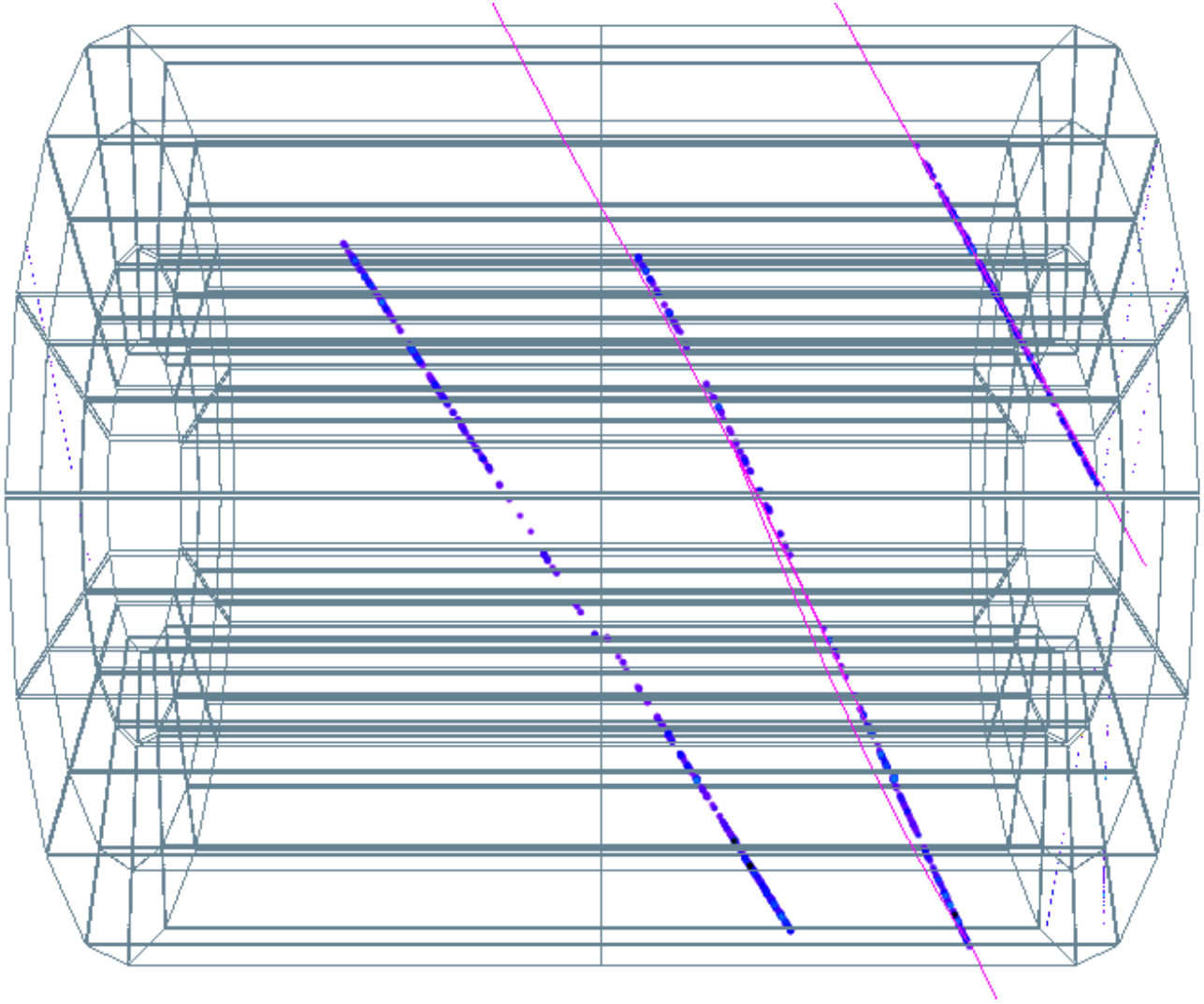
- MC: kLowMult

event: 4 eventInFile: 4 ntracks: 16 muons_esd: 8 ncosmictracks: 8



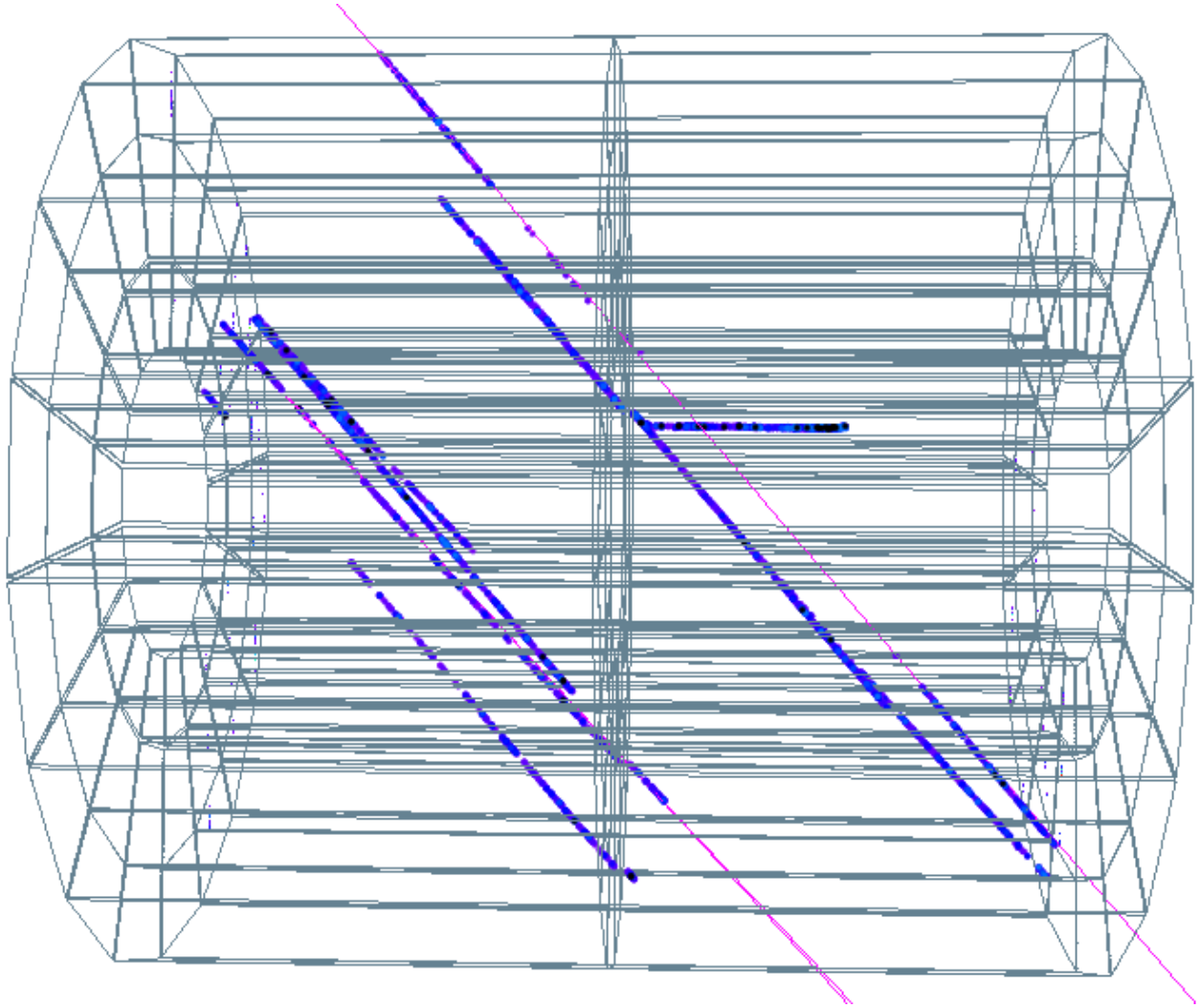
- MC: NO EVENT SPECIE

event: 0 eventInFile: 0 ntracks: 4 muons_esd: 2 ncosmictracks: 1



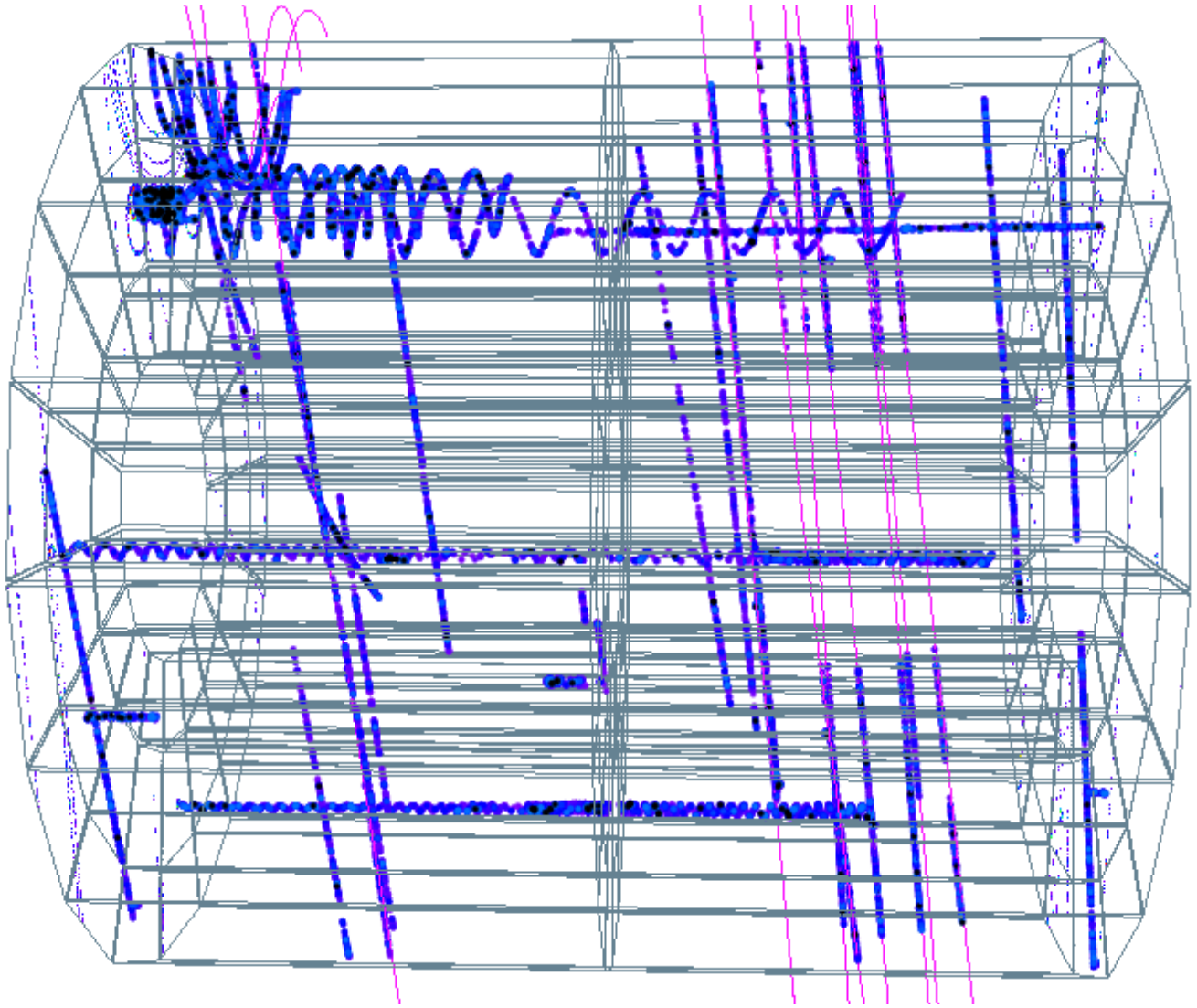
- MC: NO EVENT SPECIE

event: 1 eventInFile: 1 ntracks: 4 muons_esd: 2 ncosmictracks: 2



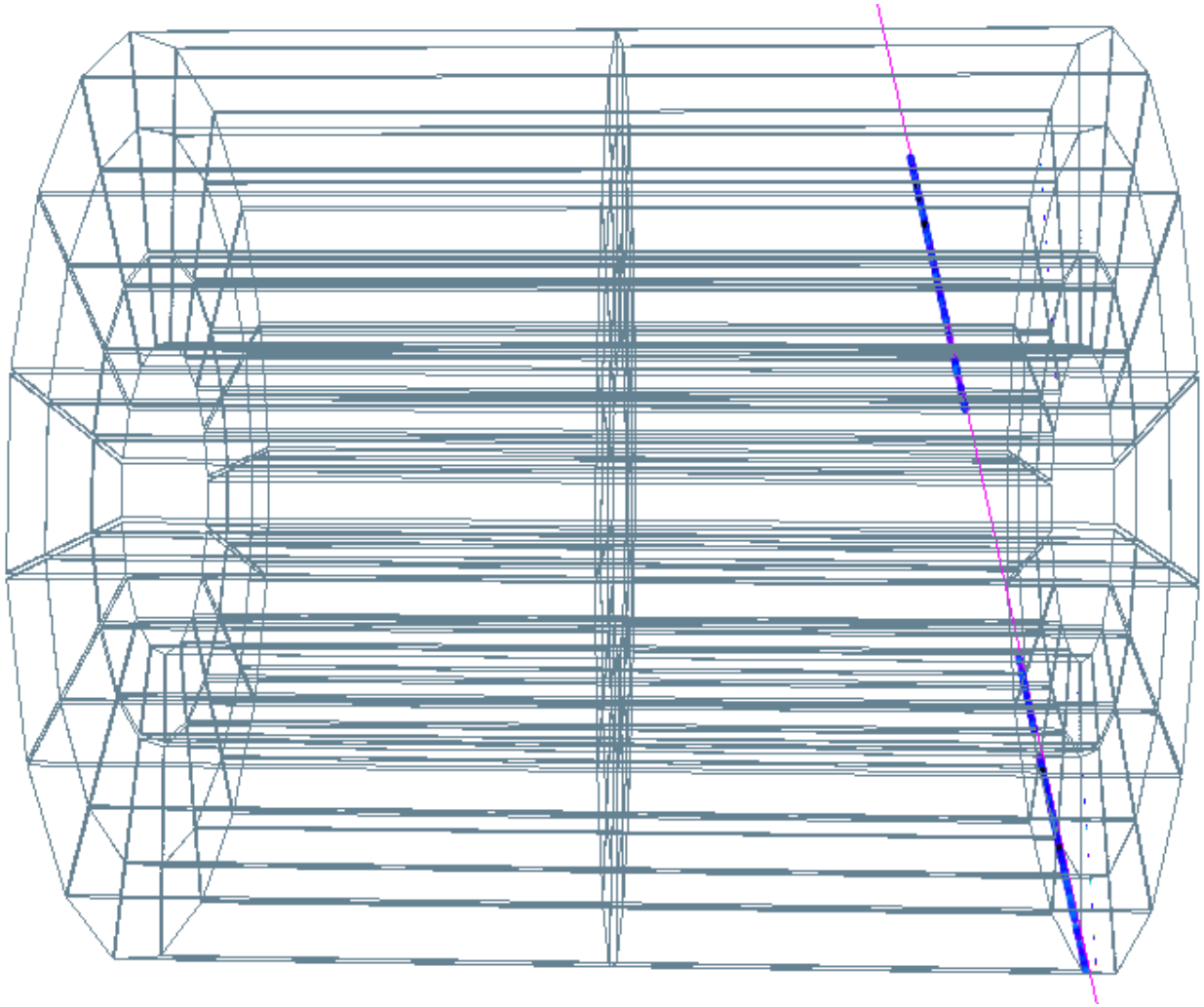
- MC: NO EVENT SPECIE

event: 2 eventInFile: 2 ntracks: 21 muons_esd: 10 ncosmictracks: 10



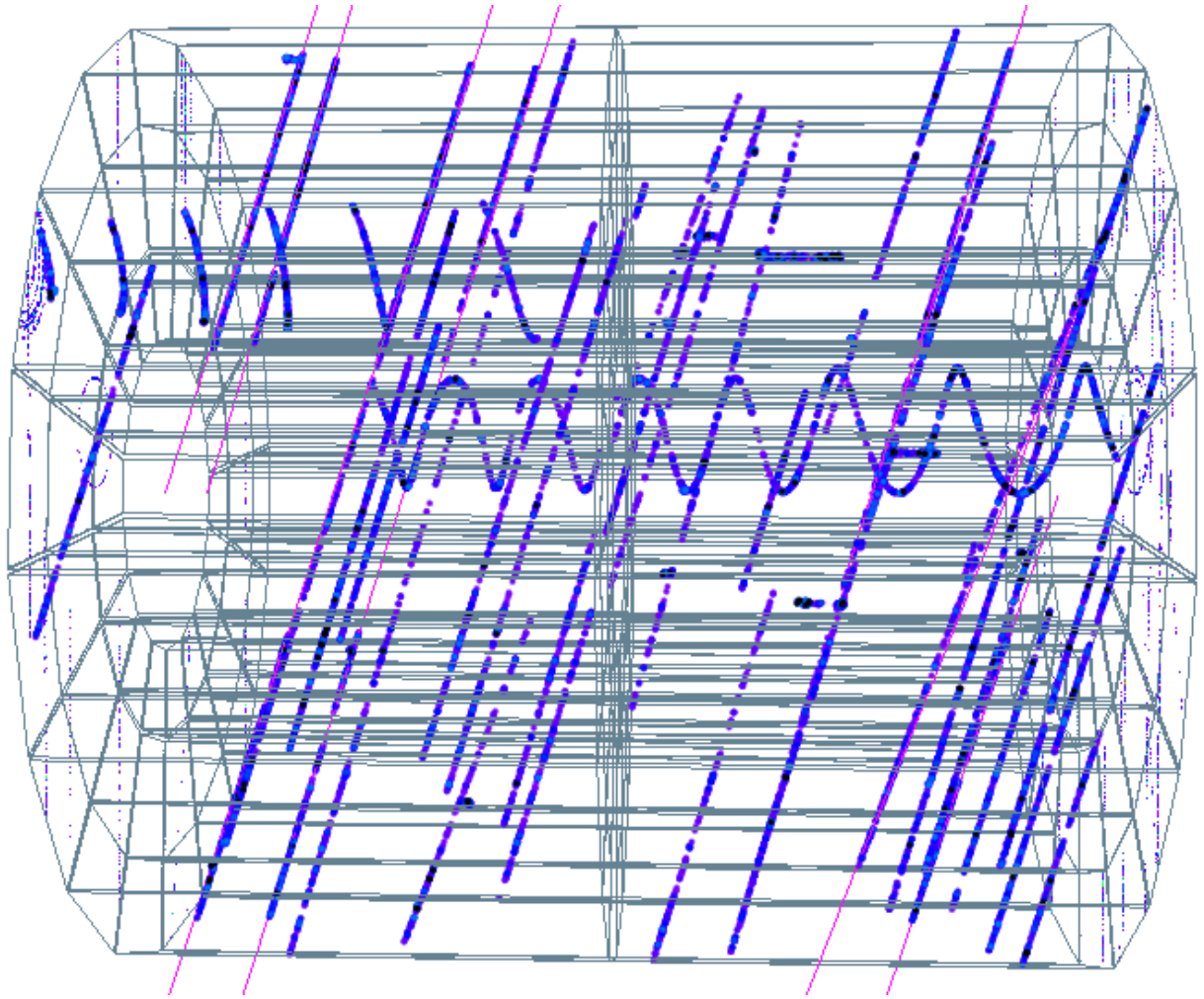
- MC: NO EVENT SPECIE

event: 3 eventInFile: 3 ntracks: 2 muons_esd: 1 ncosmictracks: 1



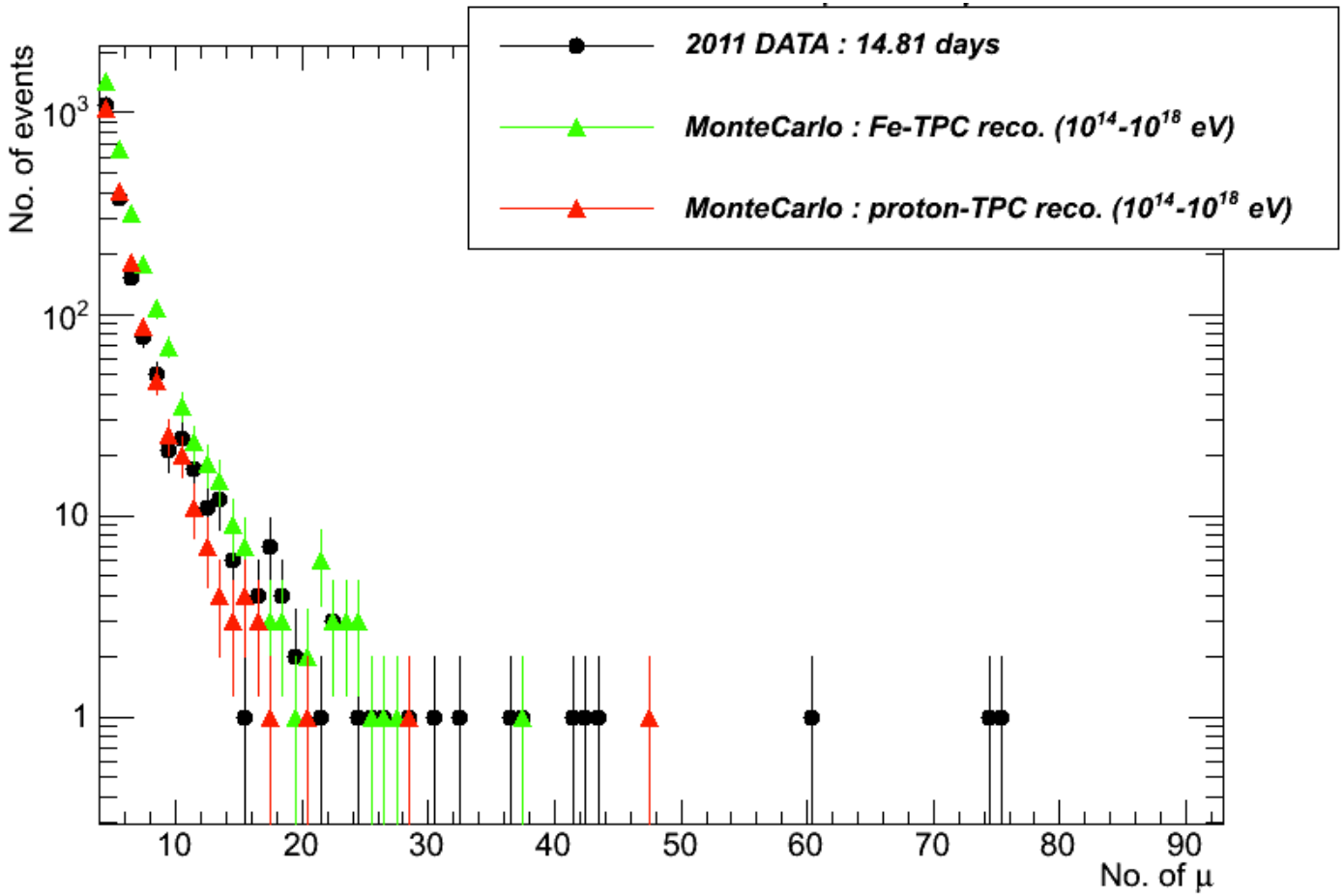
- MC: NO EVENT SPECIE

event: 4 eventInFile: 4 ntracks: 10 muons_esd: 5 ncosmictracks: 7



- MC / DATA sample

At the end, we have one plot with the proton and Fe comparison wrt the DATA of 2011: red points with our matching algorithm (proton) and green points with CosmicTracker (Fe → to be confirmed with our matching algorithm)



- Final comments

- The Corsika-AliRoot interface is working well
- According with the MC reconstructed: For atmospheric muons 40 < dE/dx < 90
- We have “half” of the preliminary result → for Fe is running again (hopefully we would have the result for next Monday)

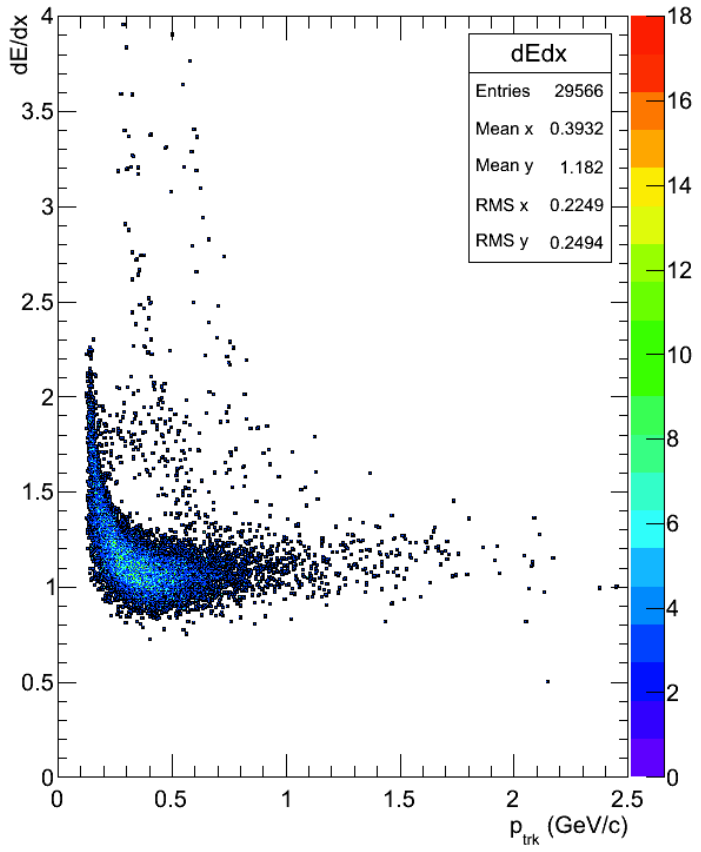
A first look to p-Pb data:

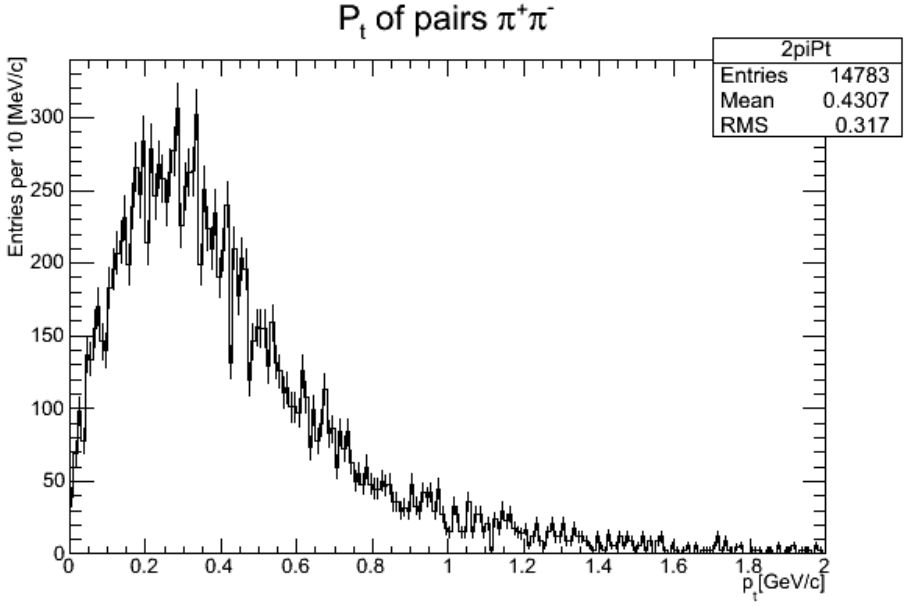
Minimum bias trigger: CINT1-B

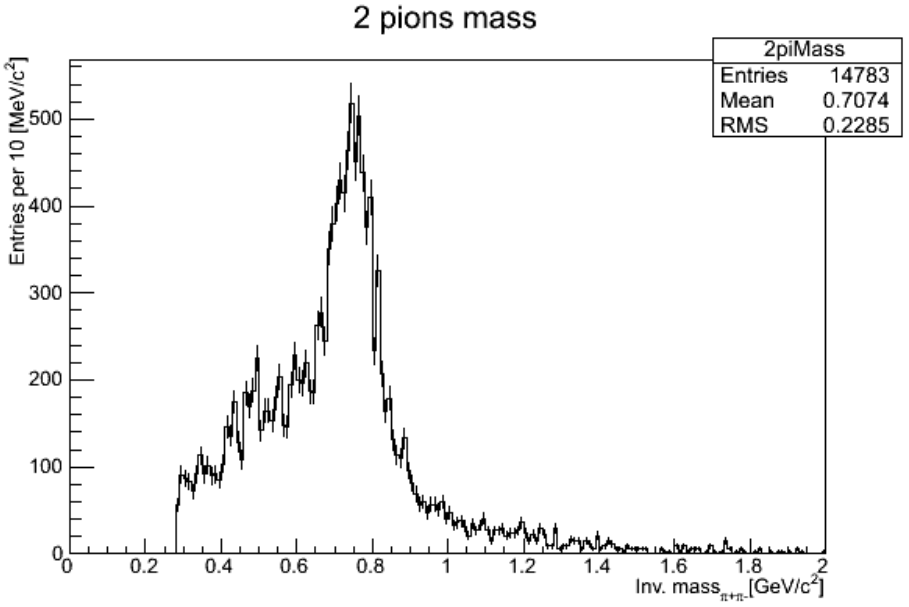
List of runs
195344
195346
195351
195389
195390
195391

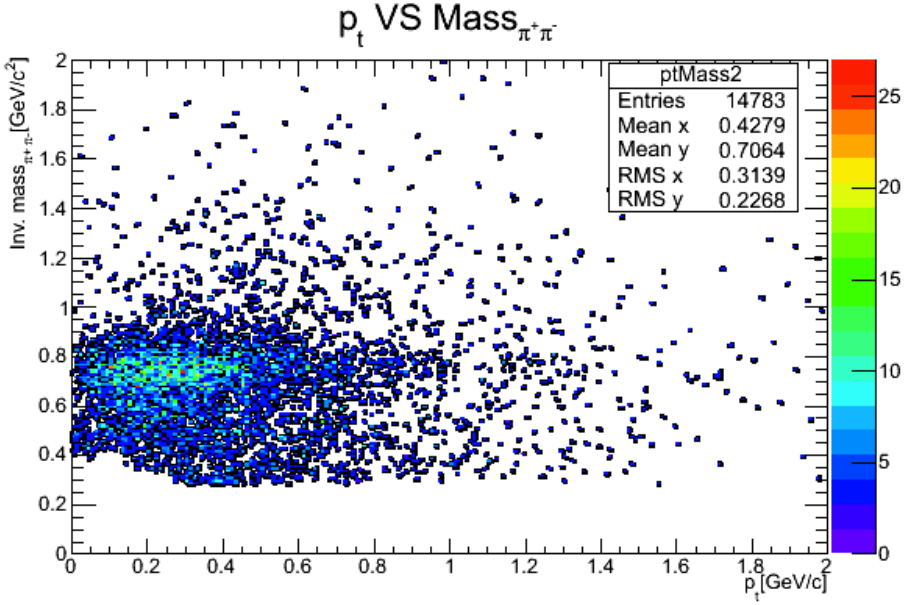
Trigger: CINT1-B && (!V0A && !V0C)

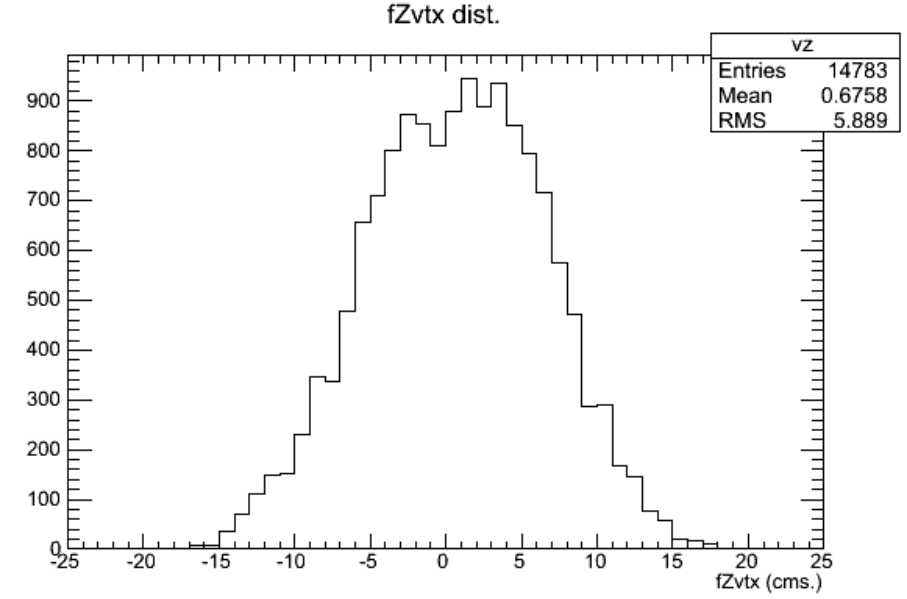
Cuts applied for 2 pions system
-- two accepted tracks: 15511
-- CutStandardTPC_ITS: 14783




P_t of pairs $\pi^+\pi^-$
2piPt
Entries 14783
Mean 0.4307
RMS 0.317
Entries per 10 [MeV/c]
p_t[GeV/c]


2 pions mass
2piMass
Entries 14783
Mean 0.7074
RMS 0.2285
Entries per 10 [MeV/c^2]
Inv. mass$_{\pi^+\pi^-}$[GeV/c^2]

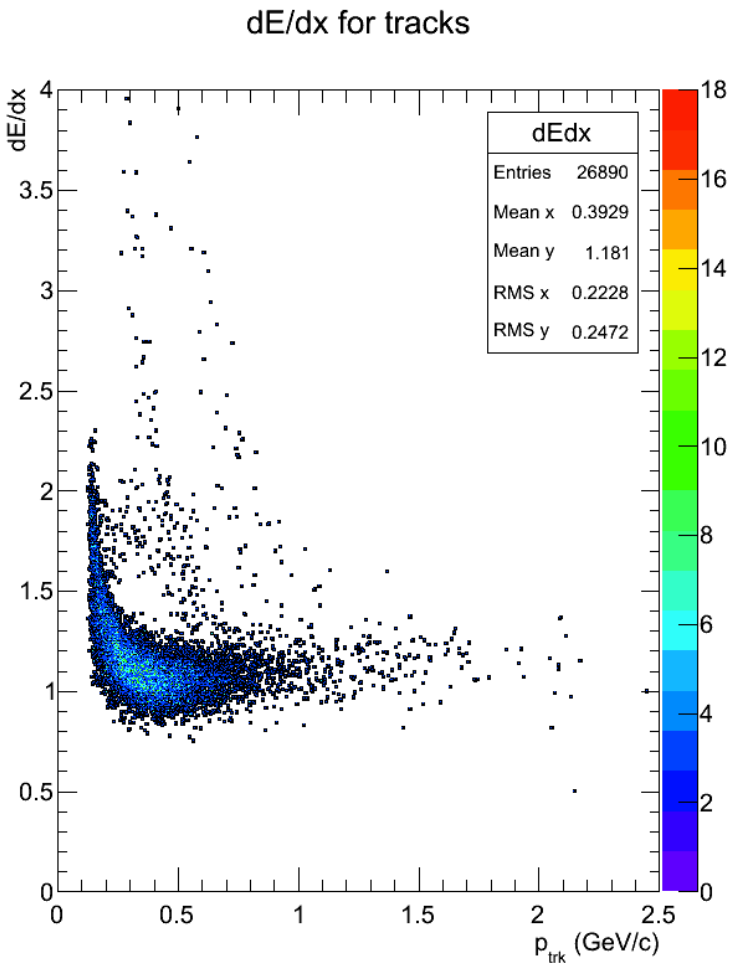

p_t VS Mass$_{\pi^+\pi^-}$
ptMass2
Entries 14783
Mean x 0.4279
Mean y 0.7064
RMS x 0.3139
RMS y 0.2268
Inv. mass$_{\pi^+\pi^-}$[GeV/c^2]
p_t[GeV/c]

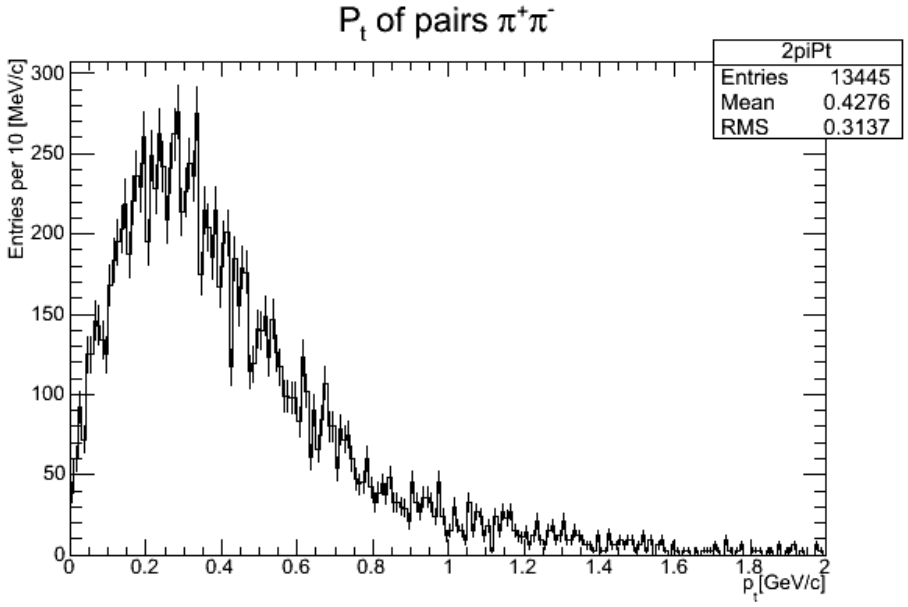

fZvtx dist.
vz
Entries 14783
Mean 0.6758
RMS 5.889
fZvtx (cms.)

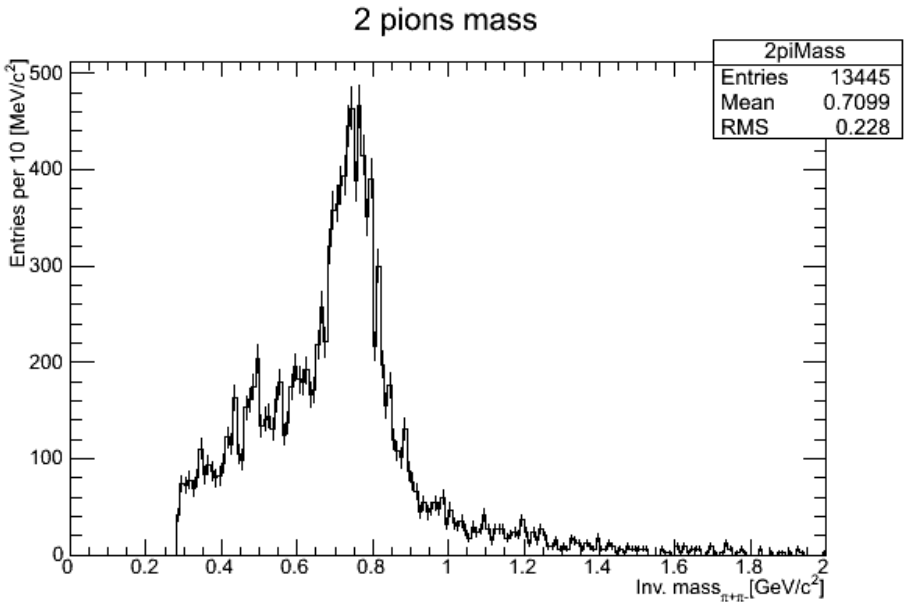
List of runs
195344
195346
195351
195389
195390
195391

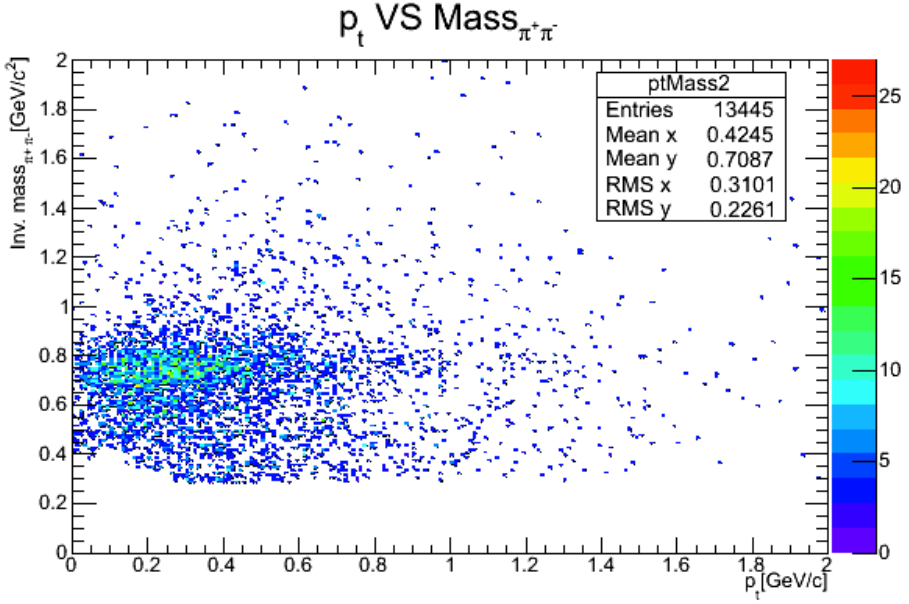
Trigger: CINT1-B && (!V0A && !V0C)

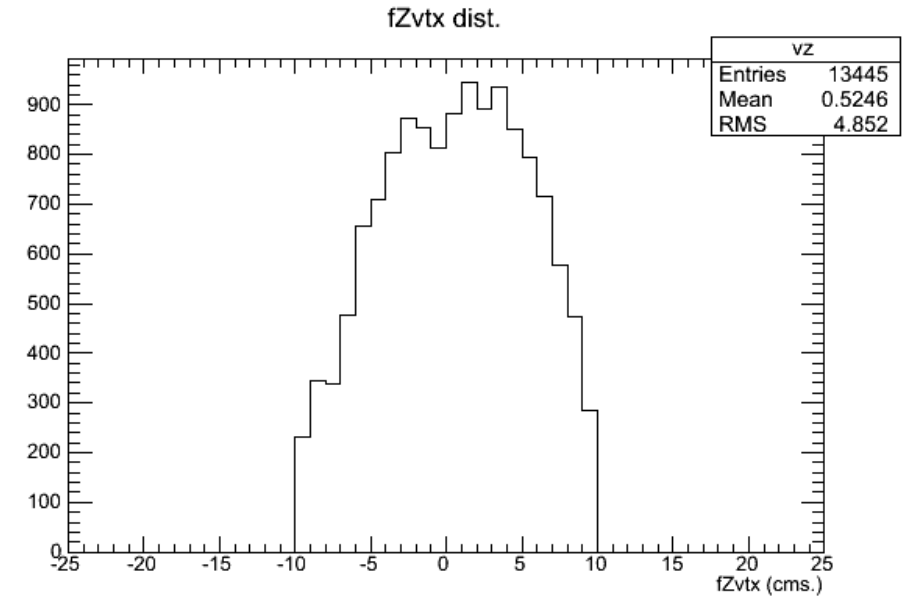
Cuts applied for 2 pions system
-- two accepted tracks: 15511
-- CutStandardTPC_ITS: 14783
-- |Vz|<10: 13445




P_t of pairs $\pi^+\pi^-$
2piPt
Entries 13445
Mean 0.4276
RMS 0.3137
Entries per 10 [MeV/c]
p_t[GeV/c]


2 pions mass
2piMass
Entries 13445
Mean 0.7099
RMS 0.228
Entries per 10 [MeV/c^2]
Inv. mass$_{\pi^+\pi^-}$[GeV/c^2]


p_t VS Mass$_{\pi^+\pi^-}$
ptMass2
Entries 13445
Mean x 0.4245
Mean y 0.7087
RMS x 0.3101
RMS y 0.2261
Inv. mass$_{\pi^+\pi^-}$[GeV/c^2]
p_t[GeV/c]

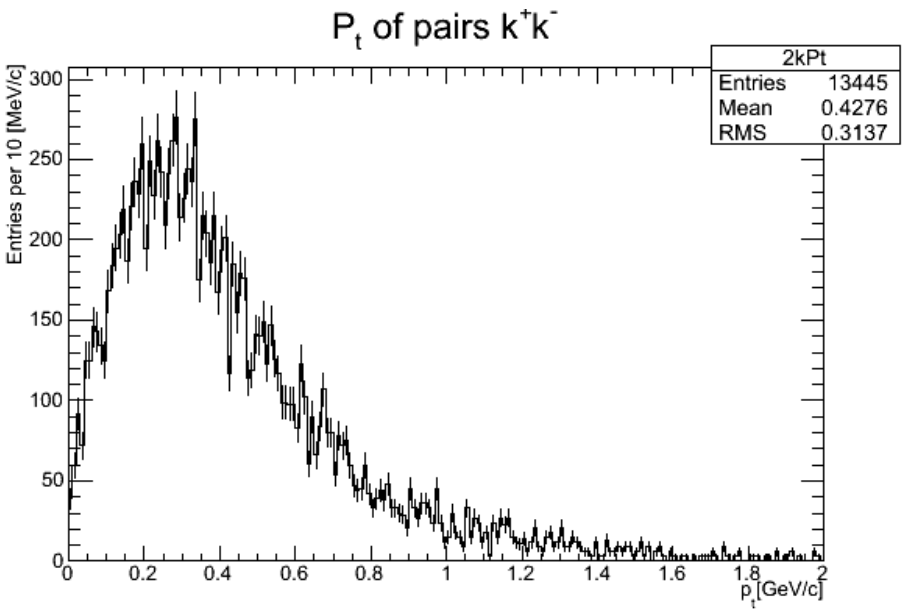

fZvtx dist.
vz
Entries 13445
Mean 0.5246
RMS 4.852
fZvtx (cms.)

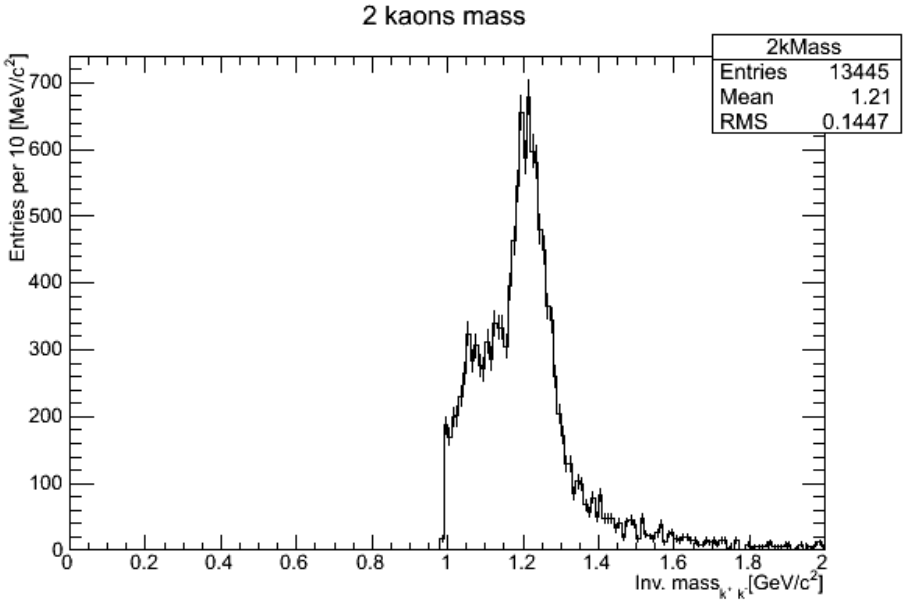
List of runs
195344
195346
195351
195389
195390
195391

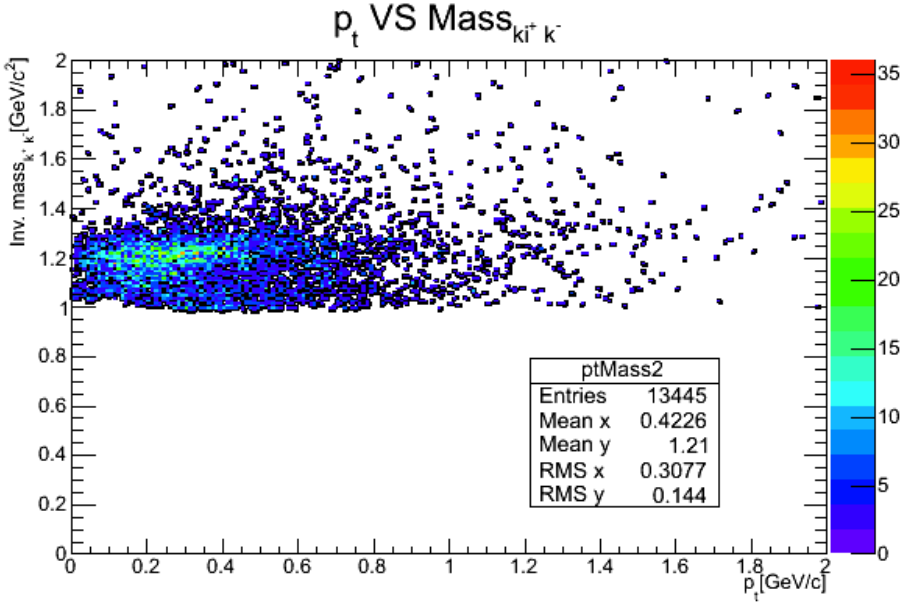
Trigger: CINT1-B && (!V0A && !V0C)

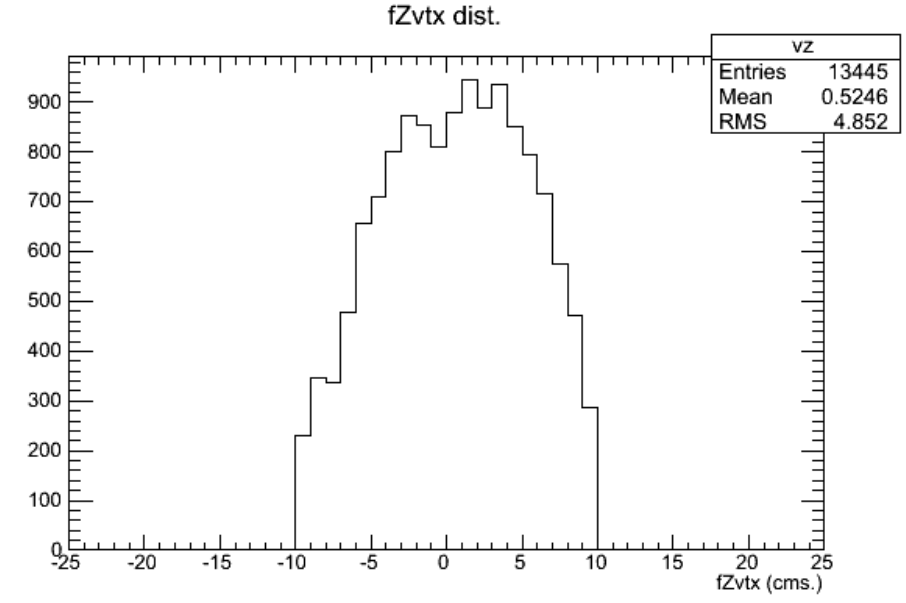
The momentum vector of each track is built assigning the kaon mass mass to the positive/negative tracks.

Cuts applied for 2 kaons system
-- two accepted tracks: 15511
-- CutStandardTPC_ITS: 14783
-- |Vz|<10: 13445


P_t of pairs k^+k^-
2kPt
Entries 13445
Mean 0.4276
RMS 0.3137
Entries per 10 [MeV/c]
p_t[GeV/c]


2 kaons mass
2kMass
Entries 13445
Mean 1.21
RMS 0.1447
Entries per 10 [MeV/c^2]
Inv. mass$_{k^+,k^-}$[GeV/c^2]

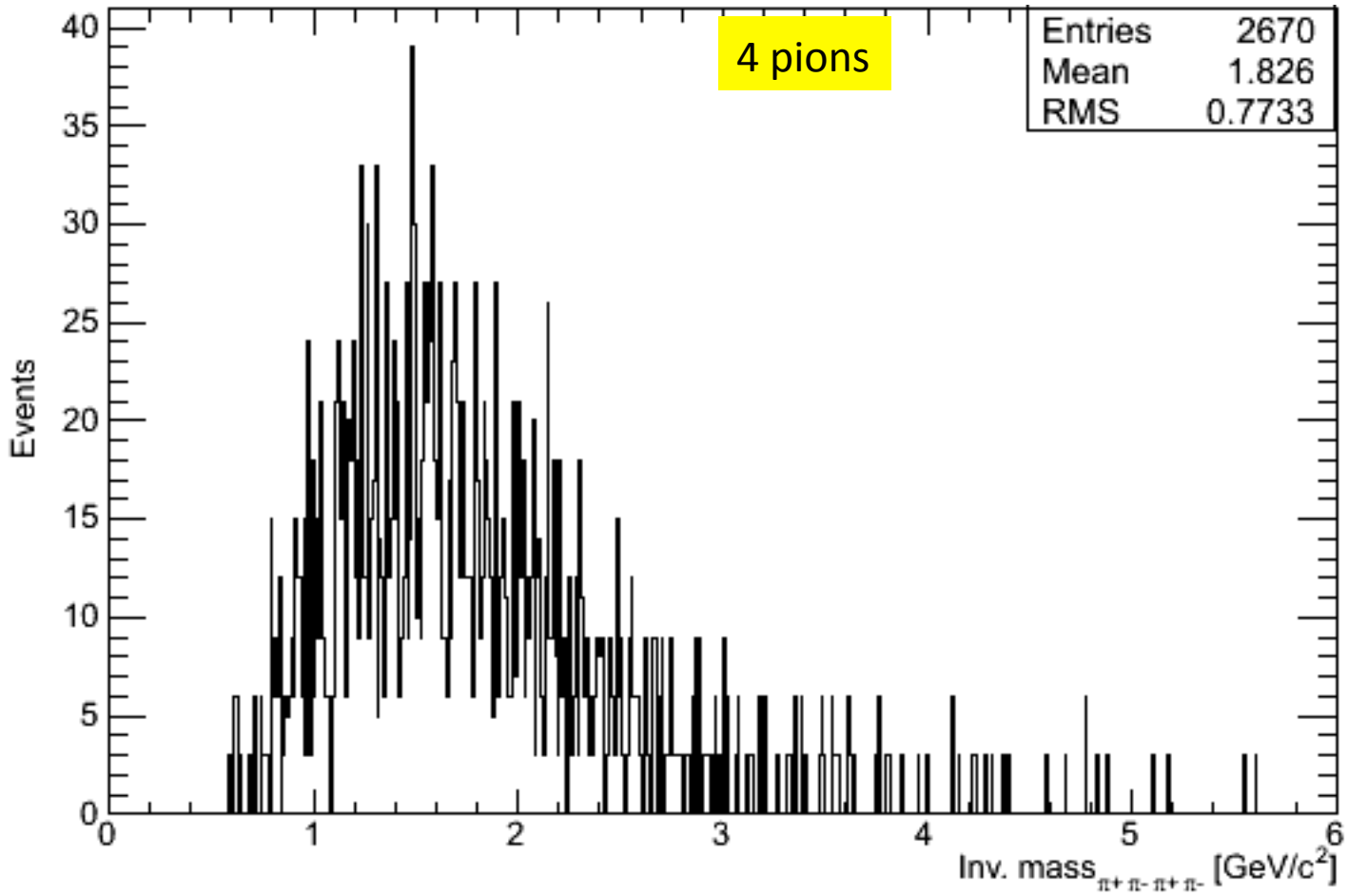

p_t VS Mass$_{ki^+ k^-}$
ptMass2
Entries 13445
Mean x 0.4226
Mean y 1.21
RMS x 0.3077
RMS y 0.144
Inv. mass$_{k^+,k^-}$[GeV/c^2]
p_t[GeV/c]

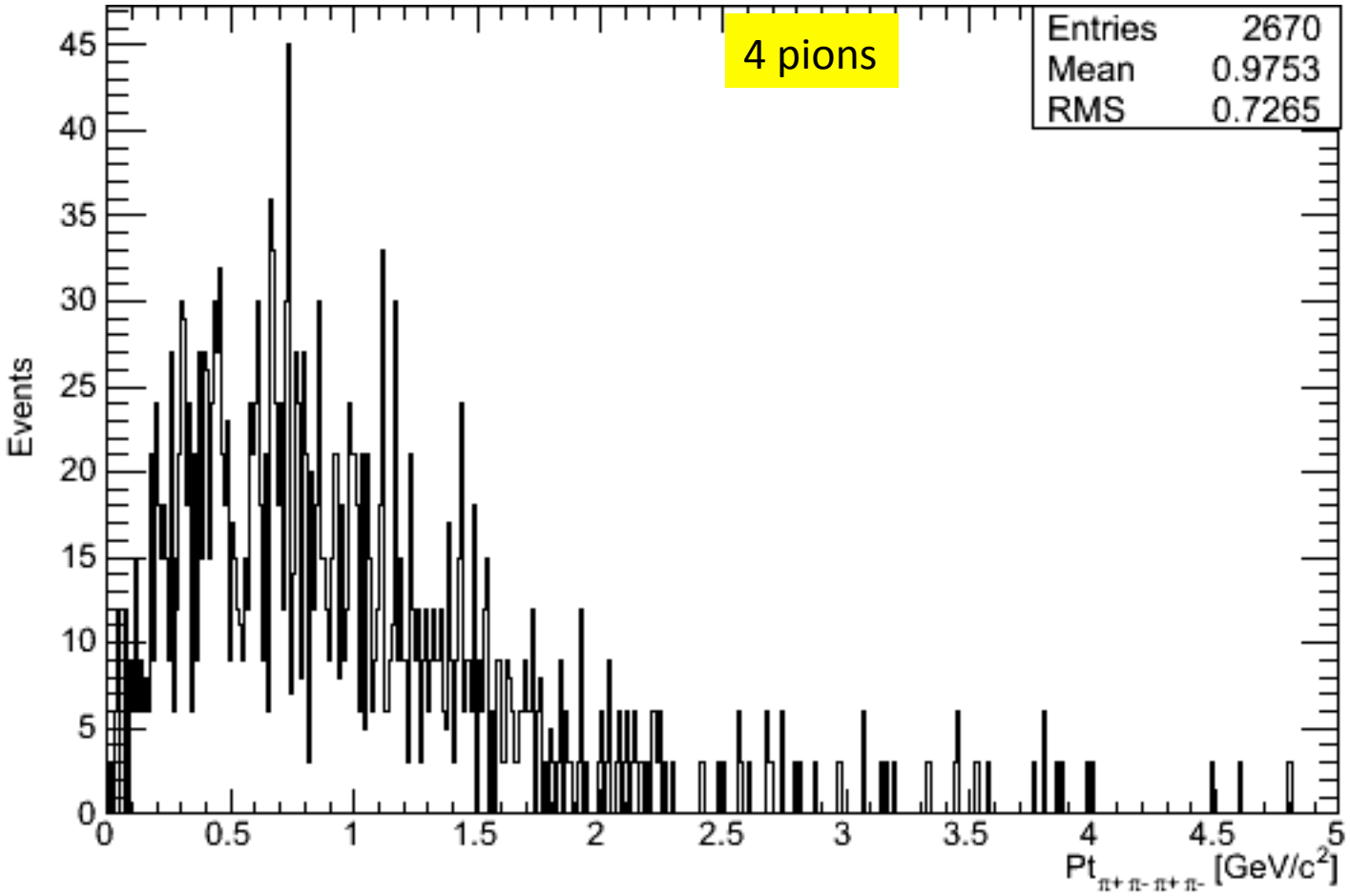

fZvtx dist.
vz
Entries 13445
Mean 0.5246
RMS 4.852
fZvtx (cms.)

List of runs
195344
195346
195351
195389
195390
195391

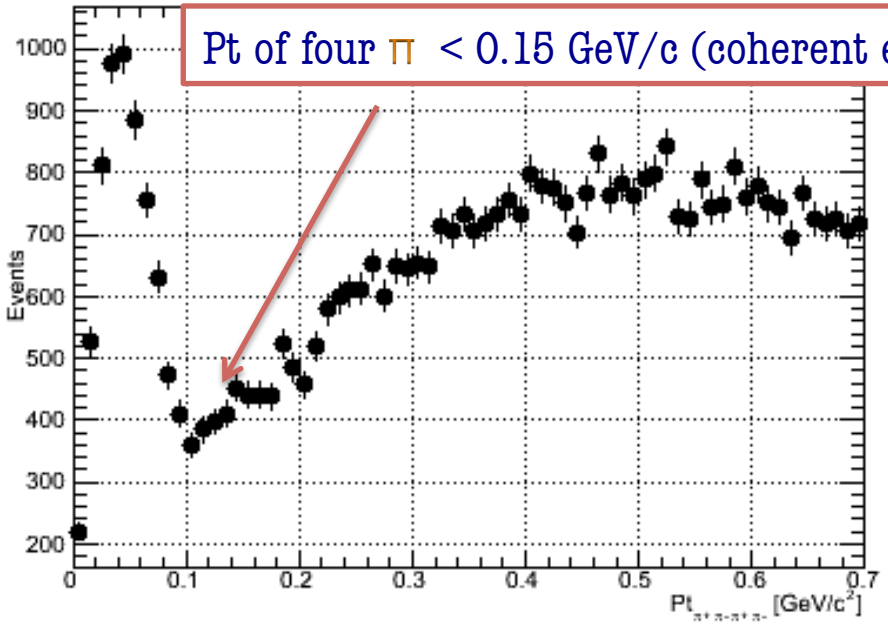
Trigger: CINT1-B && (!V0A && !V0C)

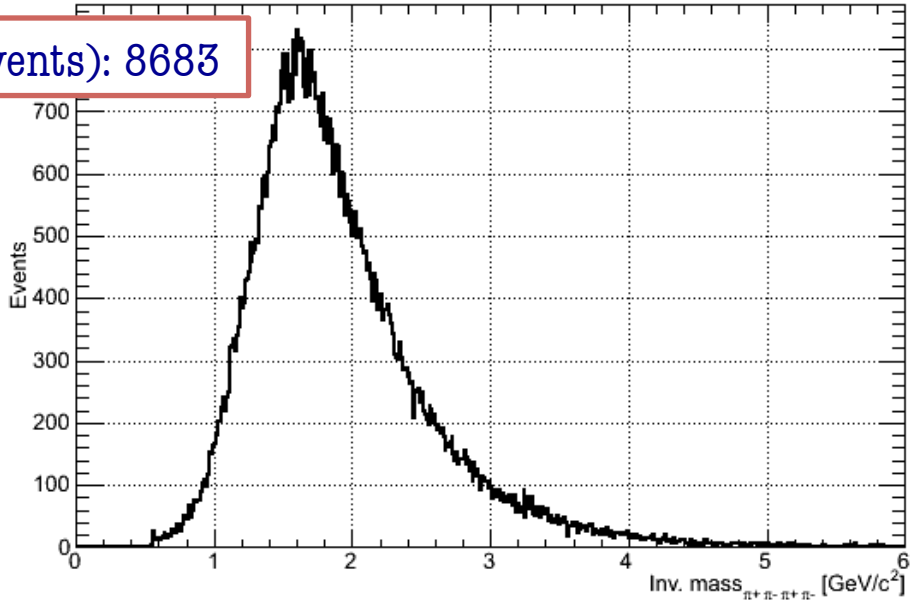
Cuts applied for 4 pions system
-- four accepted tracks: 2670

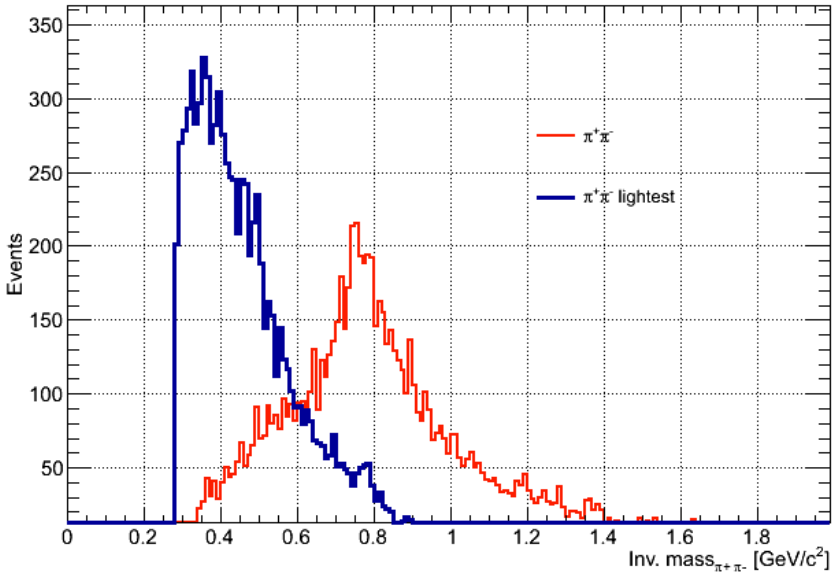

4 pions
Entries 2670
Mean 1.826
RMS 0.7733
Events
Inv. mass$_{\pi^+\pi^-\pi^+\pi^-}$ [GeV/c^2]
0
5
10
15
20
25
30
35
40
0
1
2
3
4
5
6

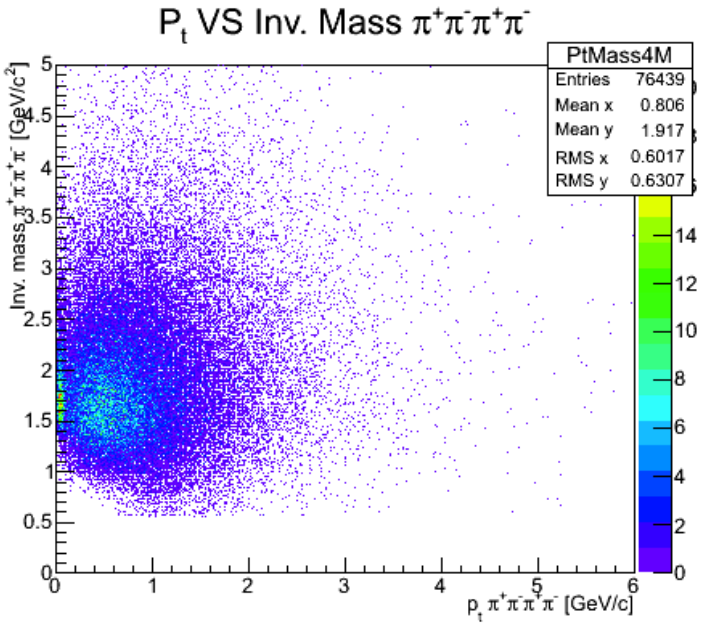

4 pions
Entries 2670
Mean 0.9753
RMS 0.7265
Events
0
5
10
15
20
25
30
35
40
45
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Pt π+ π- π+ π- [GeV/c²]

4-pi analysis: Pb-Pb data 2011 (Runs from Rigoberto)





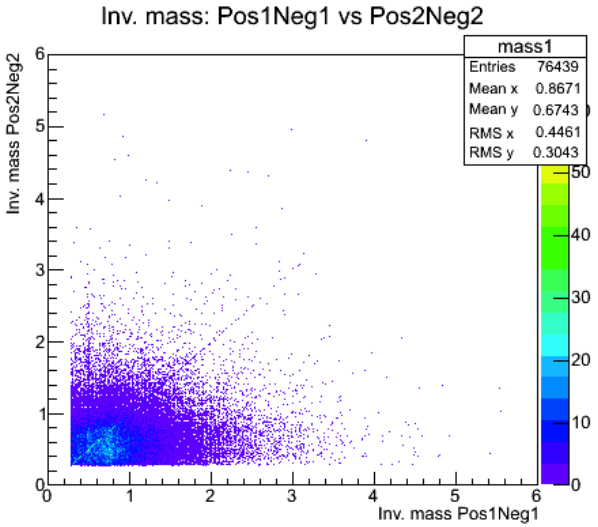


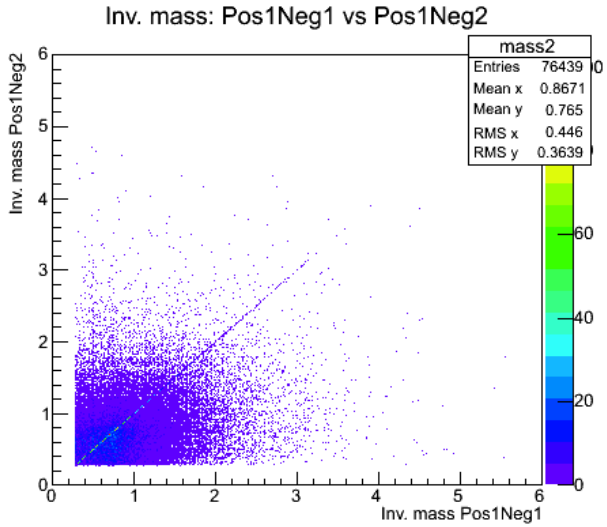


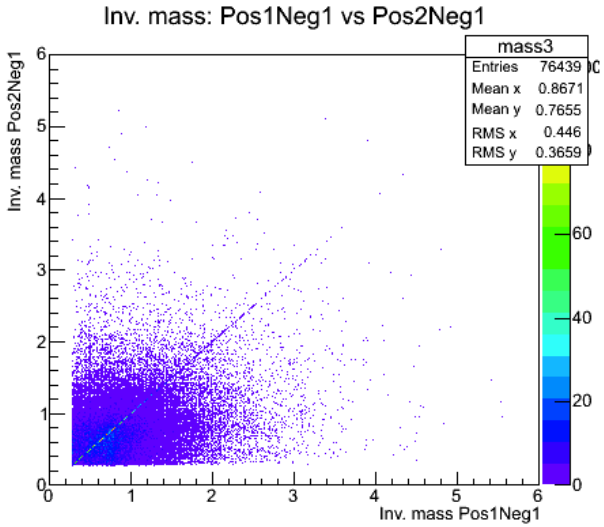
A. Szczurek

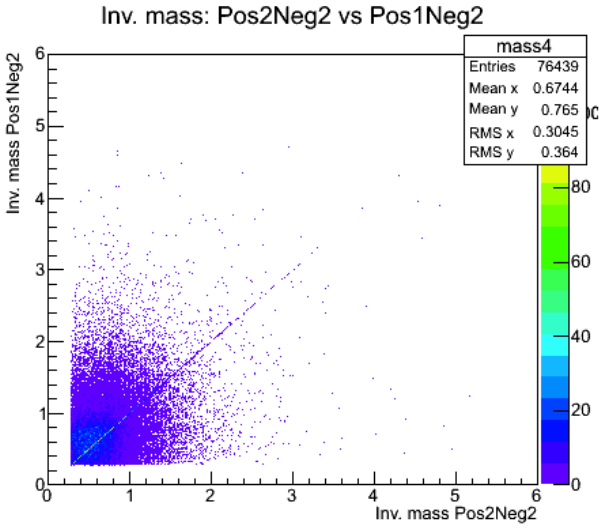
1) in the plot with minv(2pi,light) and minv(2pi,heavy) there is a peak in minv(2pi,light) around the rho^0 mass: this is due to double rho^0 production
2) it would be very interesting to make a 2D plot with minv(2pi) vs. minv(2pi) for (4pi-)coherent events. You may use all combinations. In such a plot one could maybe see different contributions, like 2rho^0, rho'->rho^0+sigma and maybe more...

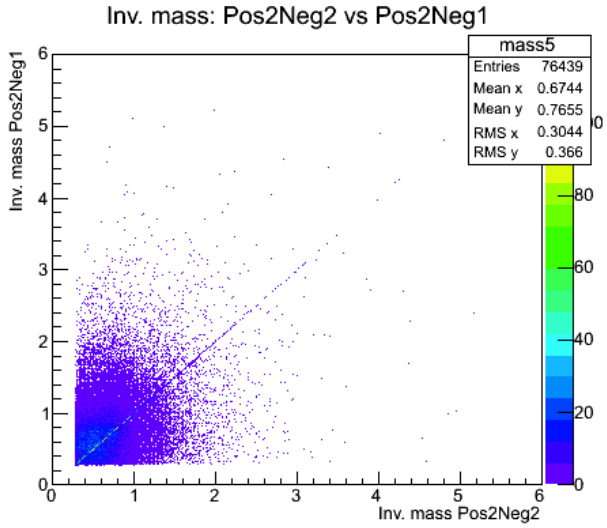
All 4-pi pt range

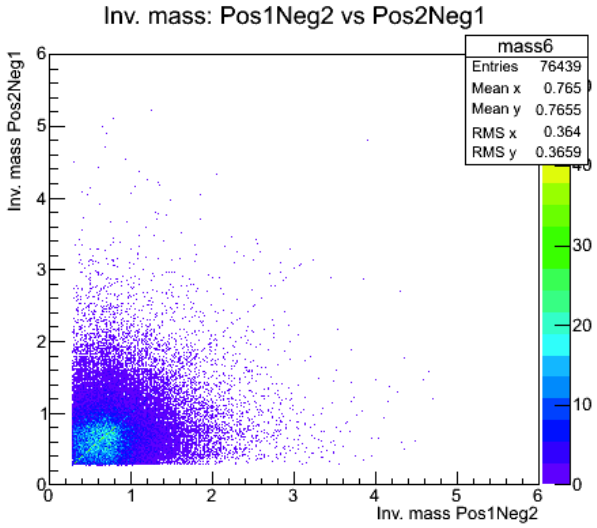












Coherent 4-pi