

# *Status of the NA61 software and DST productions*

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# *Software releases and productions*

Over last months several NA61 software (pre-)releases have been made and several processings on the 2007 NA61 data have been performed. This was important for the detector calibration as well as physics studies.

Timescale and progress:

v1r2 software release in June	07A production
(another loop of subdetector calibration)	
v1r3-1 pre-release in December	07B production
v1r3-1a pre-release (bux fixes)	07C, 07D, 07E

# *Software release v1r2 & 07A production*

The NA61 software release (v1r2) was made on June,12.

This version of the software has been used to run production [07A](#) on the full set of 2C runs (Standard Settings). The [GAP TPC has NOT been included](#) into the reconstruction chain. Batch output is in [/afs/cern.ch/na61/Production/Prod/07A](#)

The DST output of this production can be found in

- DSPACK format

  - in [/castor/cern.ch/na61/07/T2K/prod/07A/DSPACK](#)

- ROOT mDST format

  - in [/castor/cern.ch/na61/07/T2K/prod/07A/ROOT](#)

  - in [/afs/cern.ch/na61/Data/07/T2K/prod/07A](#)

# *2C runs: statistics & quality cuts*

07A production on 2C runs (Standard Settings)

Improved FTOF client is included into the reconstruction chain  
(Sebastien)

New dedxna61 client (Zoltan)

Total number of events on input is 671714

Event and track quality cuts are applied

in the same order as described by Claudia at

<https://twiki.cern.ch/twiki/bin/view/NA61/EventTrackCuts>

(only one difference in the last cut on the number of potential points:  
the cut is 10 instead of 30)

# *2C runs from 07A production*

Total number of events processed **671714**

Total number of events after Cut1 522893 (0.778446)

Total number of events after Cut2 403417 (0.600579) (0.771510)

Total number of events after Cut3 308188 (0.458808) (0.763944)

Total number of events after Cut4 277288 (0.412807) (0.899737)

Total number of tracks analysed **1044560** (multiplicity 3.767058)

Total number of tracks after Cut1 1013212 (0.969989)

Total number of tracks after Cut2 1012413 (0.969224) (0.999211)

Total number of tracks after Cut3 921265 (0.881965) (0.909970)

Total number of tracks after Cut4 907734 (0.869011) (0.985313)

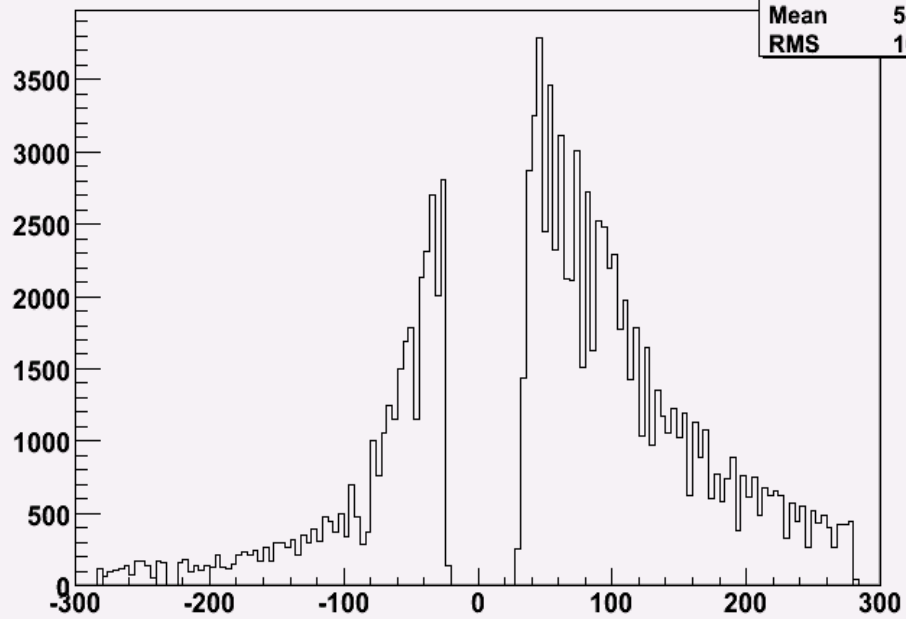
Total number of tracks after Cut5 **894383** (0.856229) (0.985292)

... among those 573550 are positive (0.641280)

... among those 320833 are negative (0.358720)

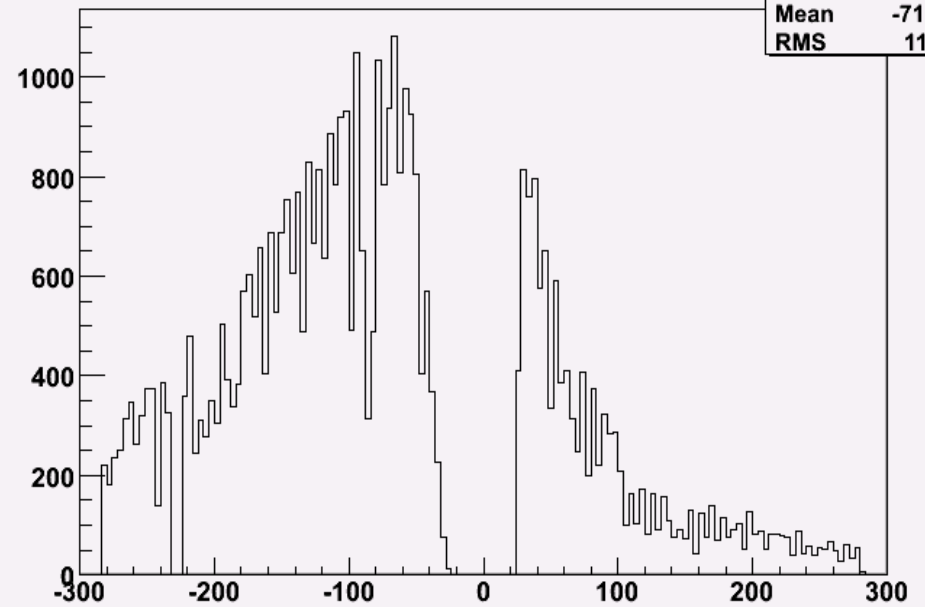
# FTOF in 2C 07A production

TofX (Pos)



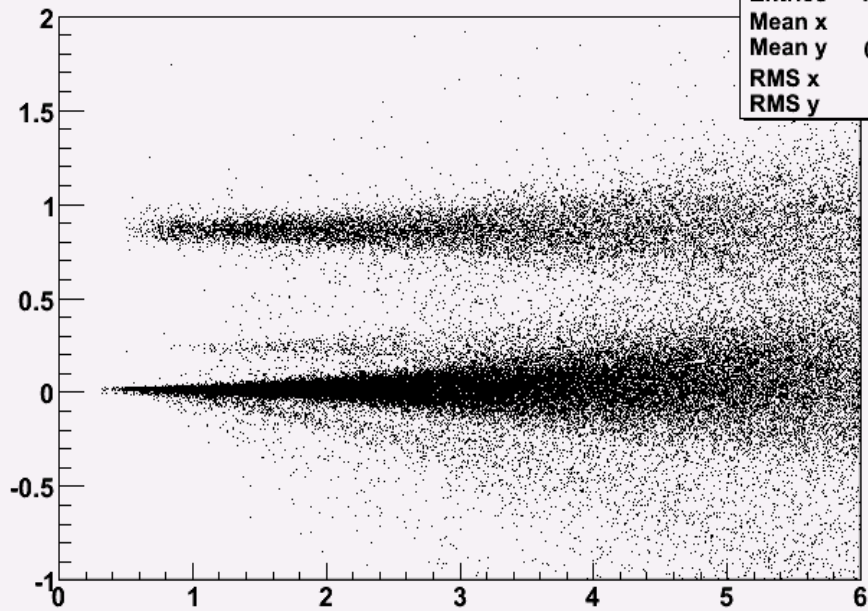
hTofXpos	
Entries	116491
Mean	54.09
RMS	107.8

TofX (Neg)



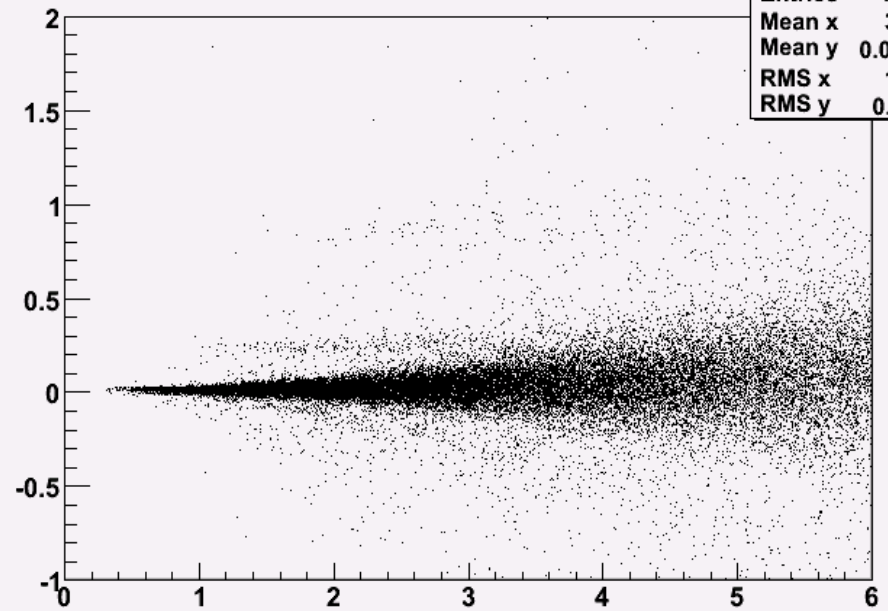
hTofXneg	
Entries	45787
Mean	-71.98
RMS	119.1

TofM2 vs Mom (Pos)



hTofM2vsMomPos	
Entries	116491
Mean x	3.291
Mean y	0.1901
RMS x	1.426
RMS y	0.385

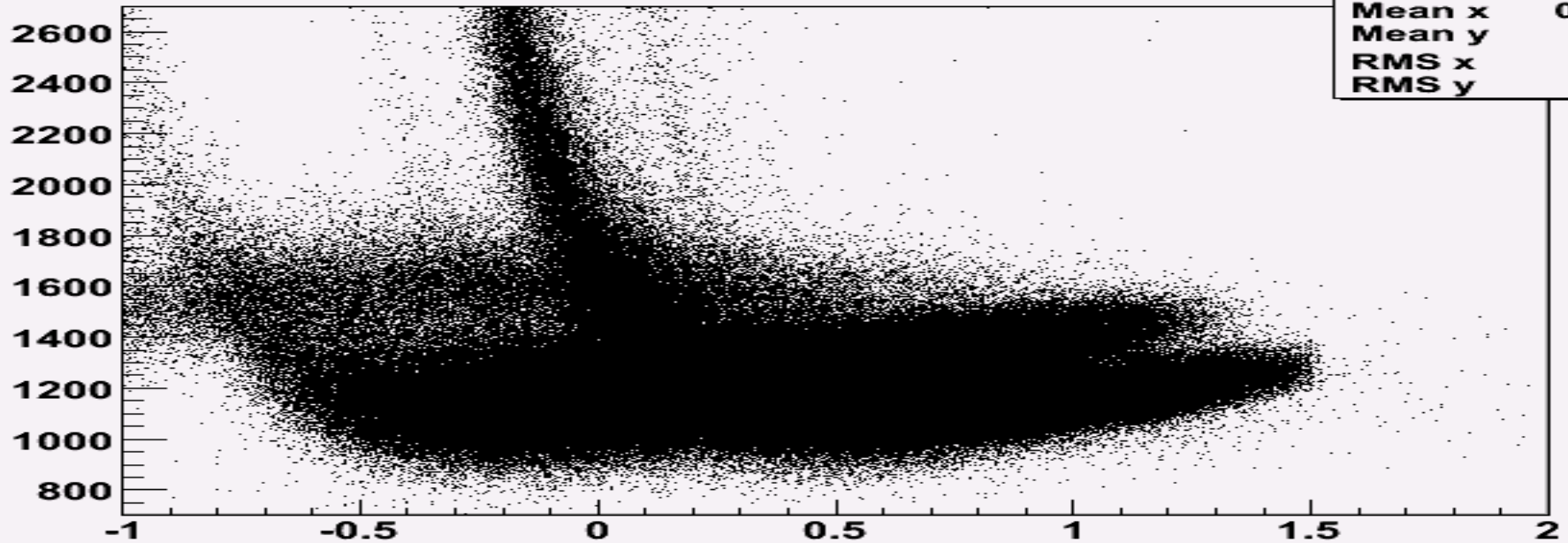
TofM2 vs Mom (Neg)



hTofM2vsMomNeg	
Entries	45787
Mean x	3.094
Mean y	0.03622
RMS x	1.397
RMS y	0.1719

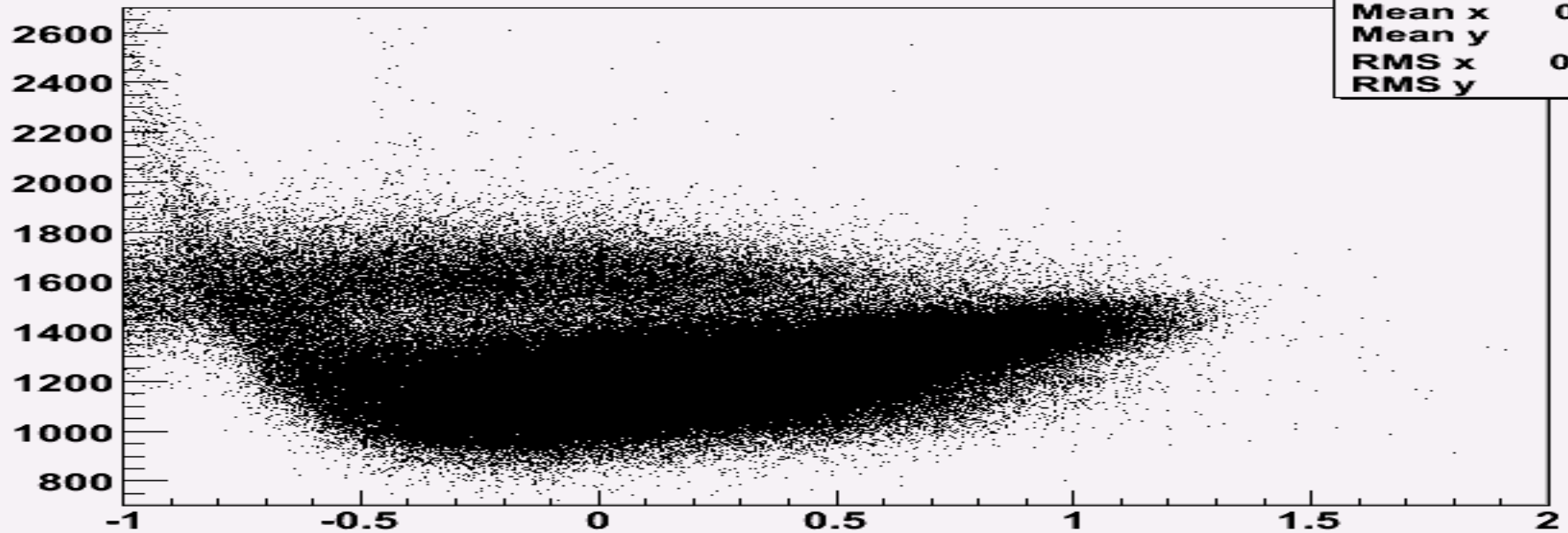
# *dEdx plots from 2C runs*

**Log(Momentum) vs Dedx**



hMomDedxPos	
Entries	573550
Mean x	0.3351
Mean y	1259
RMS x	0.444
RMS y	221

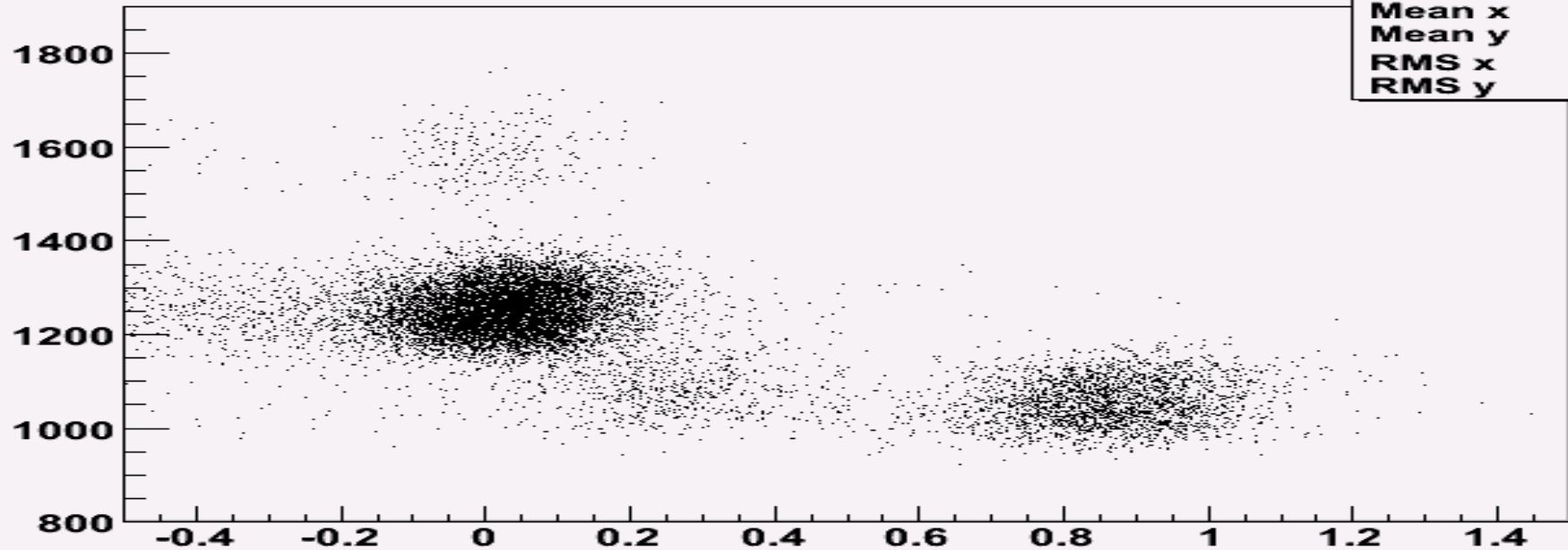
**Log(Momentum) vs Dedx**



hMomDedxNeg	
Entries	320833
Mean x	0.1741
Mean y	1251
RMS x	0.4073
RMS y	166.1

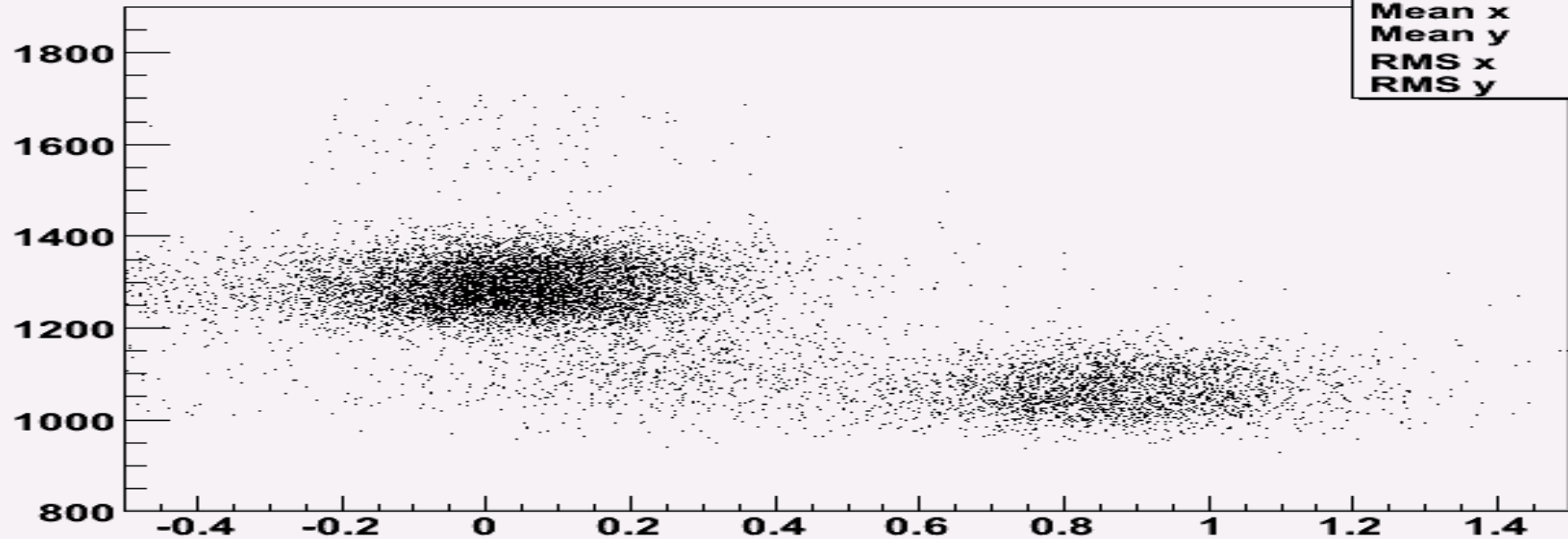
# *dEdx vs M2 plots from 2C runs*

**M2 vs Dedx (pos) 3-4 GeV/c**



hTofDedxPos3	
Entries	12662
Mean x	0.1897
Mean y	1211
RMS x	0.3594
RMS y	111.2

**M2 vs Dedx (pos) 4-5 GeV/c**



hTofDedxPos4	
Entries	11288
Mean x	0.2439
Mean y	1228
RMS x	0.3916
RMS y	119.4



# *T2K-related plot from 2C runs*

**Momentum vs Theta Plot (FTOF Pos)**

hMomThetaTofPos

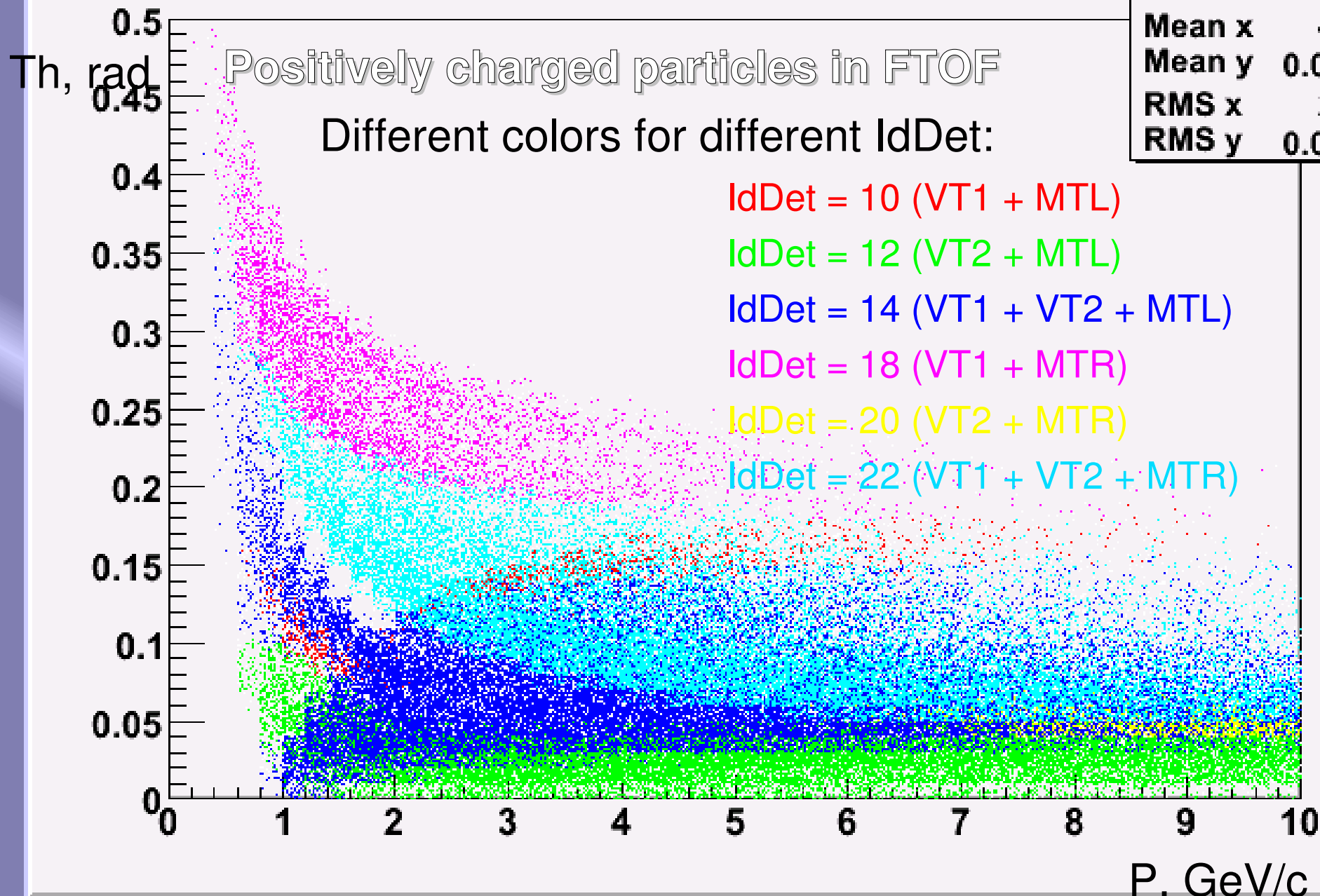
Entries 116491

Mean x 4.659

Mean y 0.08065

RMS x 2.459

RMS y 0.06299



# *07A production: special and LT runs*

After the processing of 2C (Standard Settings) runs some special runs (July, 9) and all LT runs (September,3) have been processed.

The DSTs can be found in

</castor/cern.ch/na61/07/T2K/prod/07A/special> and

</castor/cern.ch/na61/07/T2K/prod/07A/replica> respectively.

(see <https://twiki.cern.ch/twiki/bin/view/NA61/ProductionFiles>)

The GAP TPC is still being calibrated and was **NOT** included.

The results of the 07A production have been already used for the preparation of the NA61 SPSC July 2008 Status Report and can be also used to extract some physics results from the NA61 2007 data...

# *LT runs from 07A production*

Total number of events processed **234805**

Total number of events after Cut1 212821 (0.906373)

Total number of events after Cut2 124690 (0.531036) (0.585891)

Total number of events after Cut3 87142 (0.371125) (0.698869)

Total number of events after Cut4 84478 (0.359779) (0.969429)

**! cut on the Z position of the primary vertex is:  $-680 < Z \text{ (cm)} < -530$**

Total number of tracks analysed **383498** (multiplicity 4.539620)

Total number of tracks after Cut1 376361 (0.981390)

Total number of tracks after Cut2 375263 (0.978527) (0.997083)

Total number of tracks after Cut3 290059 (0.756351) (0.772949)

Total number of tracks after Cut4 266216 (0.694178) (0.917799)

Total number of tracks after Cut5 **255309** (0.665738) (0.959030)

... among those 154990 are positive (0.607068)

... among those 100319 are negative (0.392932)

# *Software pre-release & 07B production*

Dec,2 a new NA61 software pre-release (**v1r3-1**) was made.

Currently it corresponds to the “**new**” level.

This version of the software has been used to run production **07B** on the full set of 2C runs (Standard Settings). The **GAP TPC has been included** into the reconstruction chain. Batch output is in

</afs/cern.ch/na61/Production/Prod/07B>

The output of this production can be found in

- DSPACK format: </castor/cern.ch/na61/07/T2K/prod/07B/DSPACK>
- ROOT mDST format: </castor/cern.ch/na61/07/T2K/prod/07B/ROOT>  
(and in </afs/cern.ch/na61/Data/07/T2K/prod/07B>)

Another version of the pre-release (**v1r3-1a**) with a correction in the ODF track\_tof structure (na49\_event\_str.h) currently corresponds to the “**verynew**” level.

# *2C runs: statistics & quality cuts*

07B production on 2C runs (Standard Settings)

Inclusion of the GAP TPC (Antoni A. , Claudia)

New TOF-L/R clients (Vadim)

Improved FTOF client (Sebastien)

Improved dedxna61 client (Zoltan)

Total number of events on input is 671377

Event and track quality cuts are applied

in the same order as described by Claudia at

<https://twiki.cern.ch/twiki/bin/view/NA61/EventTrackCuts>

(two differences: first track quality cut removed; in the last cut on the number of potential points: the cut is 10 instead of 30)

# *2C runs from 07B production*

Total number of events processed **671377**

Total number of events after Cut1 620704 (0.924524)

Total number of events after Cut2 377740 (0.562635) (0.608567)

Total number of events after Cut3 339329 (0.505422) (0.898314)

Total number of events after Cut4 292955 (0.436349) (0.863336)

Total number of tracks analysed **1260483** (multiplicity 4.302651)

Total number of tracks after Cut1 1260483 (1.000000)

Total number of tracks after Cut2 1247090 (0.989375) (0.989375)

Total number of tracks after Cut3 1166472 (0.925417) (0.935355)

Total number of tracks after Cut4 1150637 (0.912854) (0.986425)

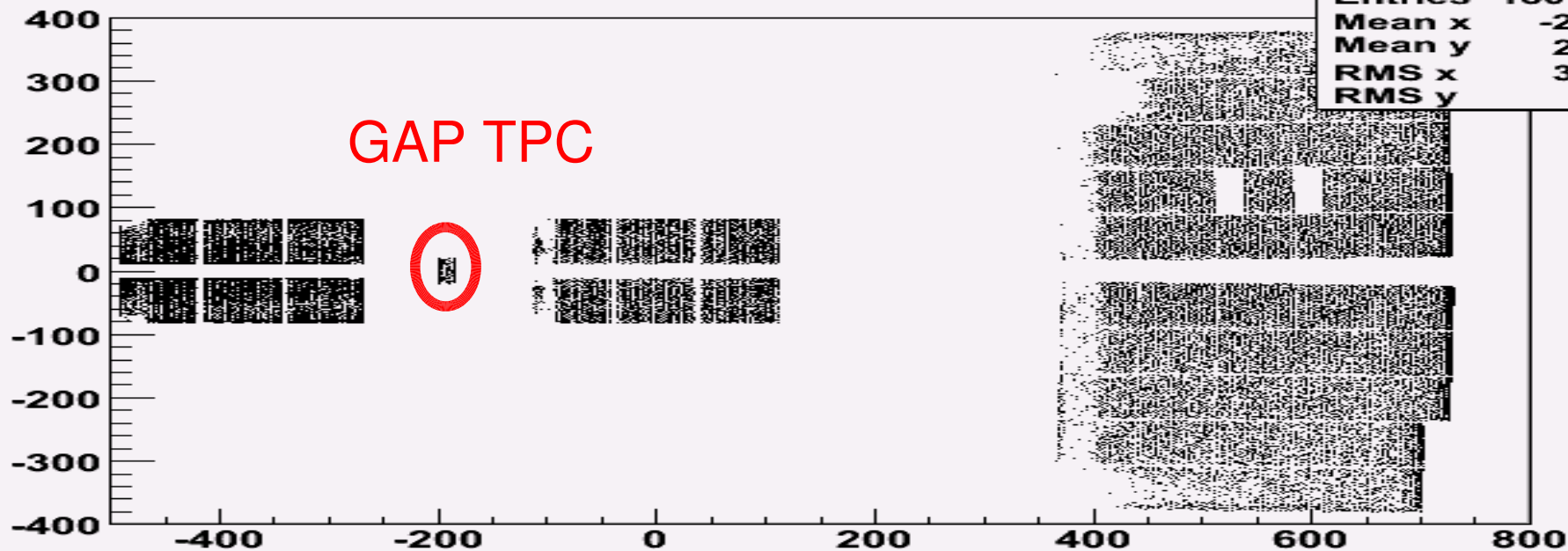
Total number of tracks after Cut5 **903711** (0.716956) (0.785401)

... among those 573714 are positive (0.634842)

... among those 329997 are negative (0.365158)

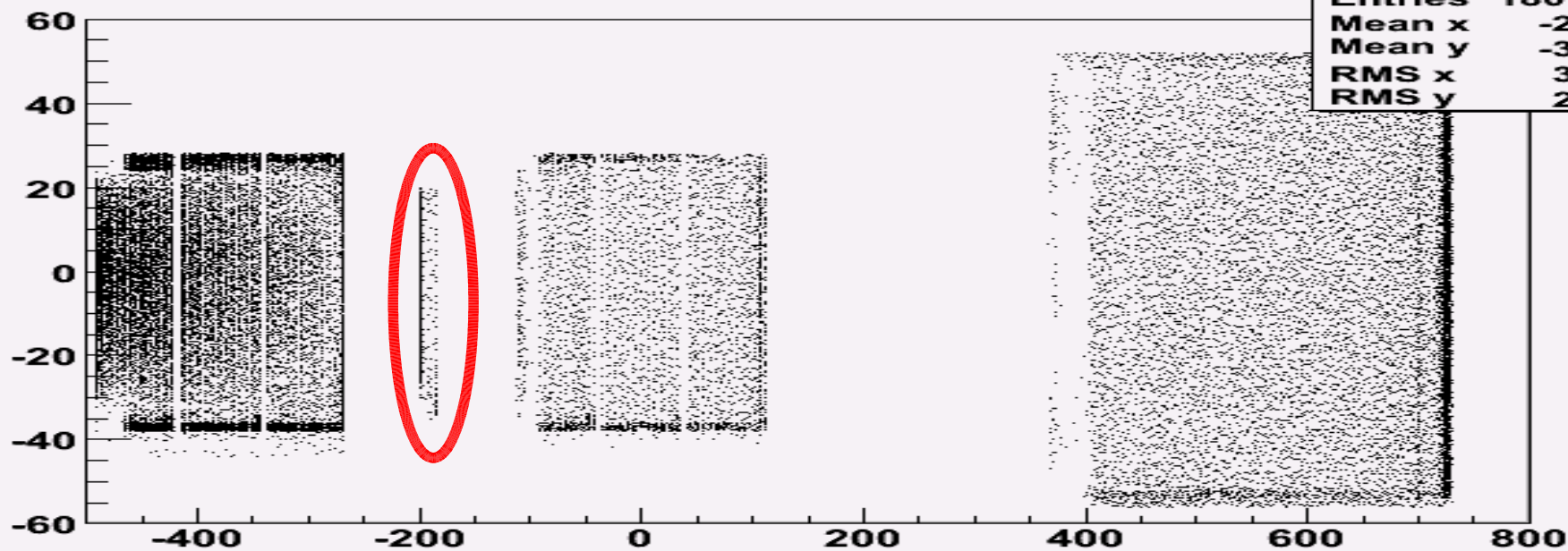
# First/last point from 07B 2C runs

First and last (X Z)



hXZfl	
Entries	1807422
Mean x	-227.9
Mean y	2.942
RMS x	395.6
RMS y	71.9

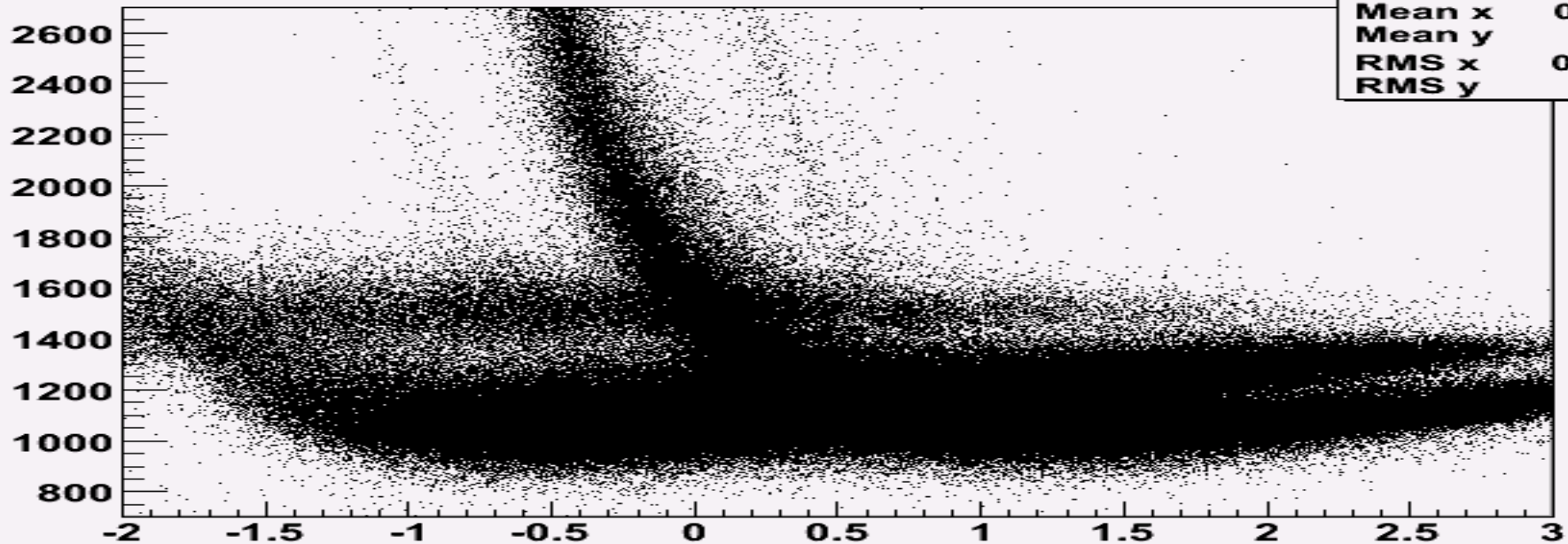
First and last (Y Z)



hYZfl	
Entries	1807422
Mean x	-227.9
Mean y	-3.757
RMS x	395.6
RMS y	22.03

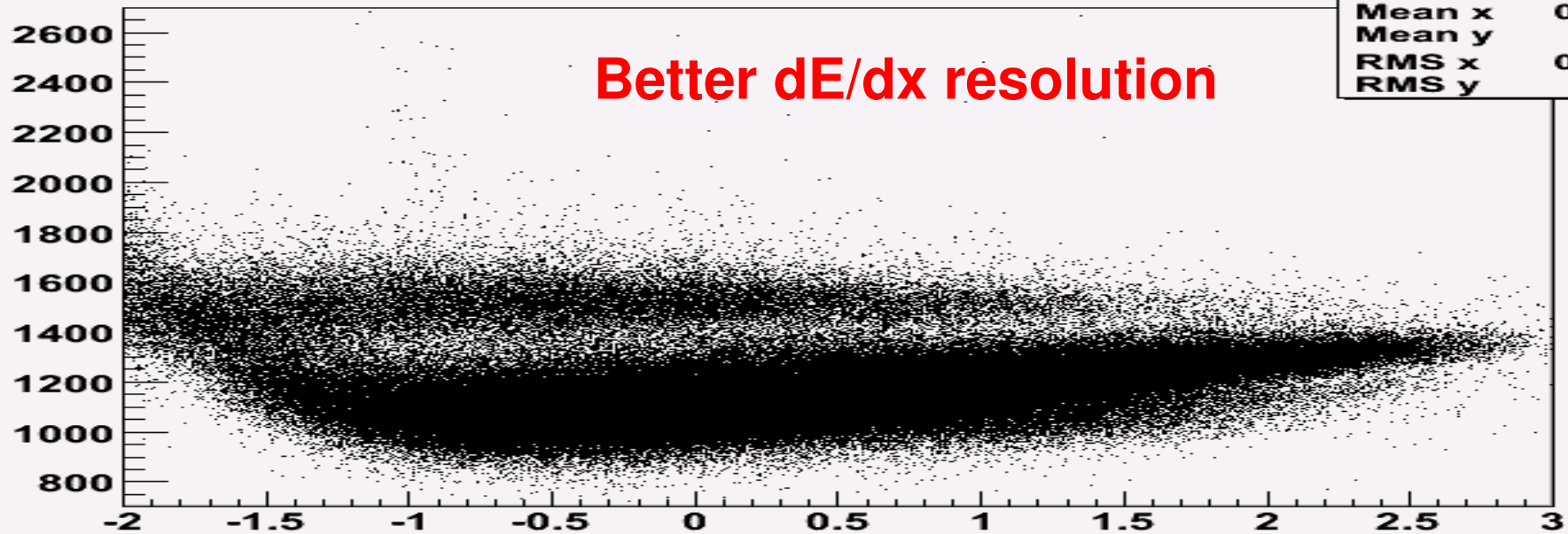
# *dEdx plots from 07B 2C runs*

Log(Momentum) vs Dedx



hMomDedxPos	
Entries	573714
Mean x	0.6947
Mean y	1195
RMS x	0.9654
RMS y	217

Log(Momentum) vs Dedx



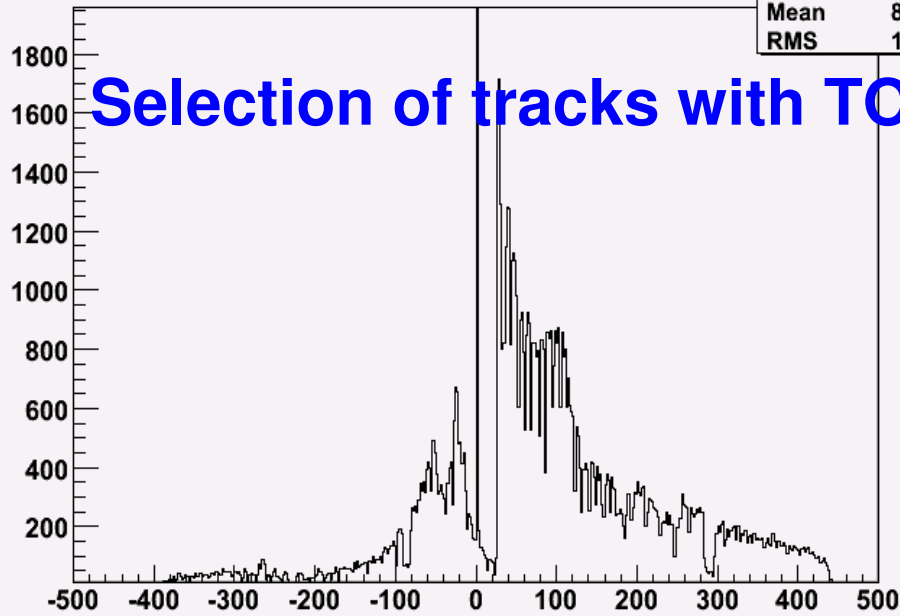
**Better dE/dx resolution**

hMomDedxNeg	
Entries	329997
Mean x	0.3745
Mean y	1177
RMS x	0.8977
RMS y	141.2

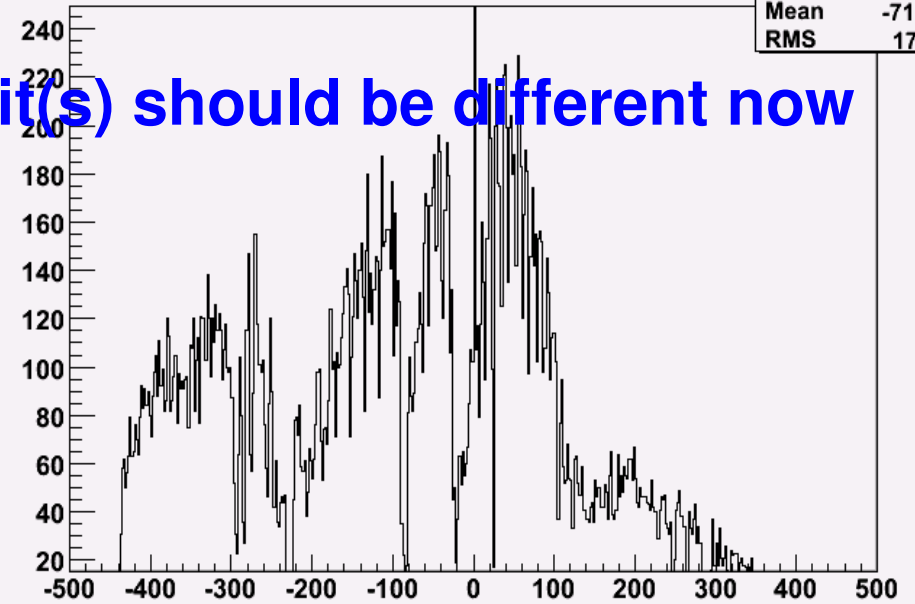


# TOFs in 2C 07B production

TofX (Pos)

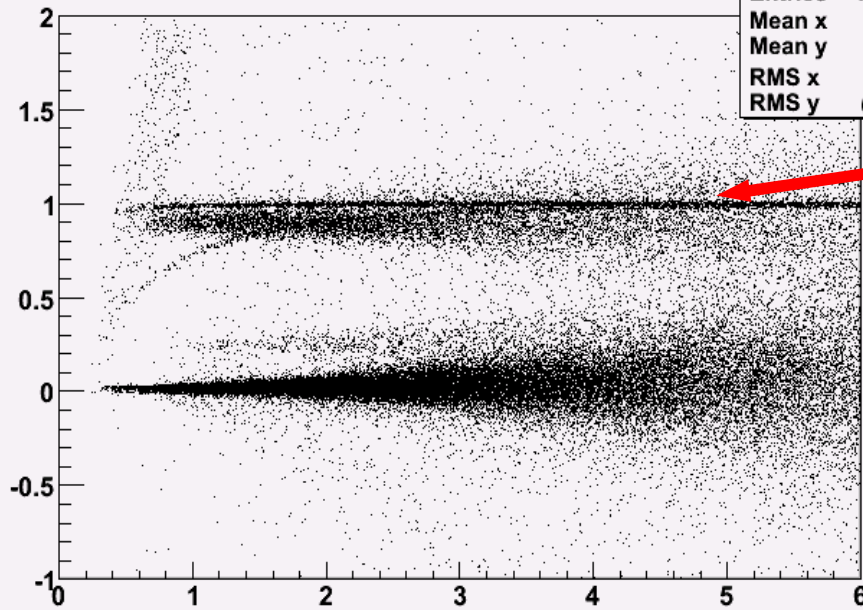


TofX (Neg)

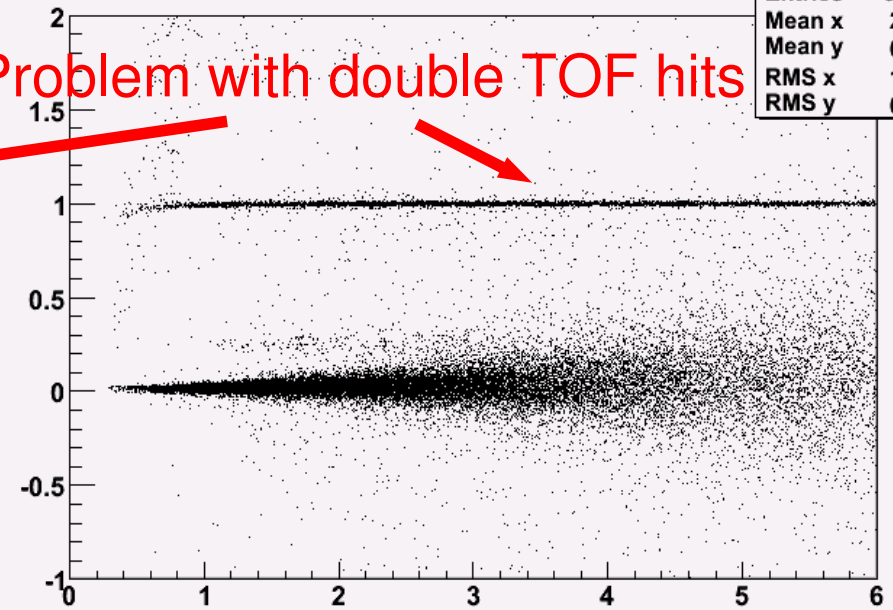


Selection of tracks with TOF hit(s) should be different now

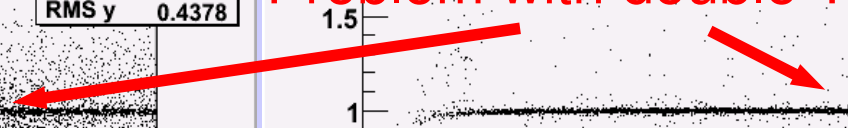
TofM2 vs Mom (Pos)



TofM2 vs Mom (Neg)

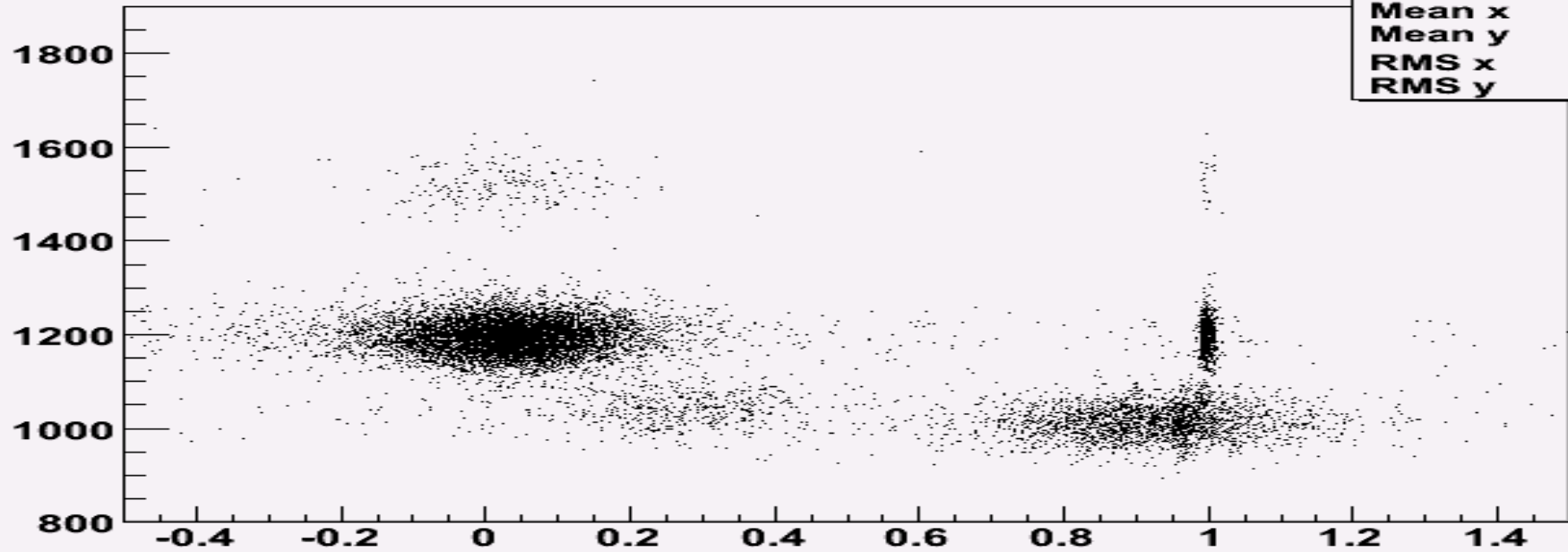


Problem with double TOF hits



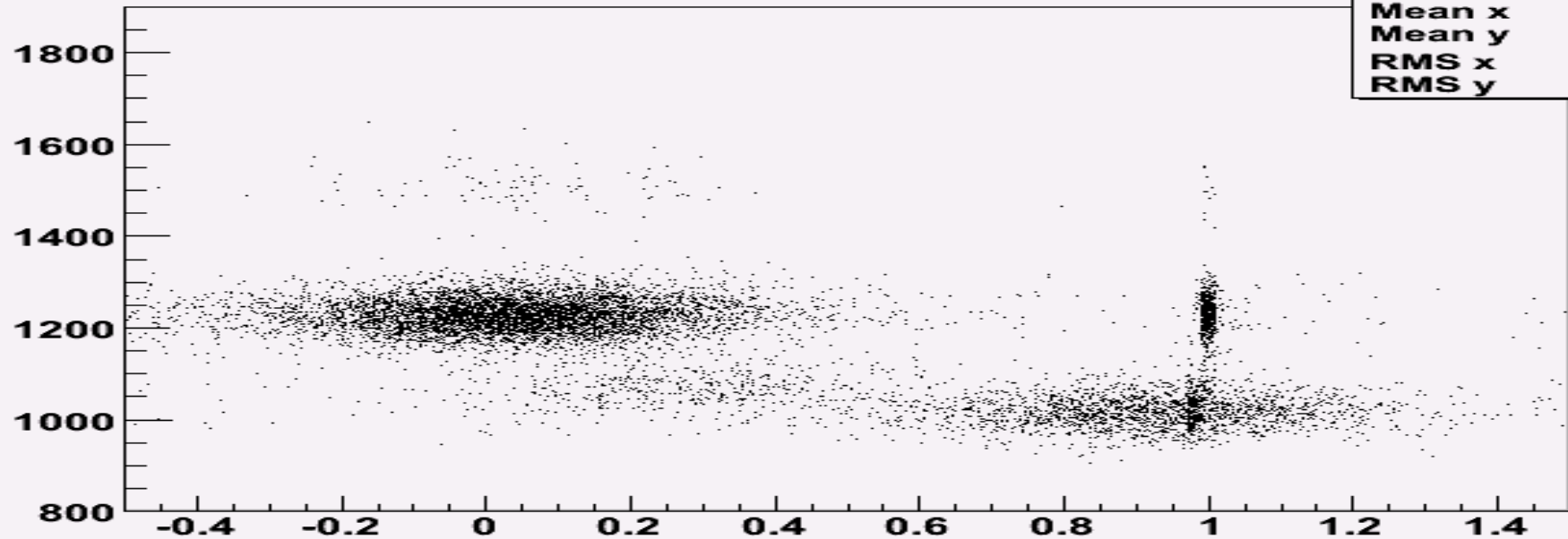
# *dEdx vs M2 plots from 2C runs*

**M2 vs Dedx (pos) 3-4 GeV/c**



hTofDedxPos3	
Entries	15639
Mean x	0.2829
Mean y	1158
RMS x	0.4164
RMS y	98.71

**M2 vs Dedx (pos) 4-5 GeV/c**



hTofDedxPos4	
Entries	12475
Mean x	0.3206
Mean y	1172
RMS x	0.4434
RMS y	103.8

# *T2K-related plot from 2C 07B runs*

**Momentum vs Theta Plot (TOF Pos)**

hMomThetaTofPos

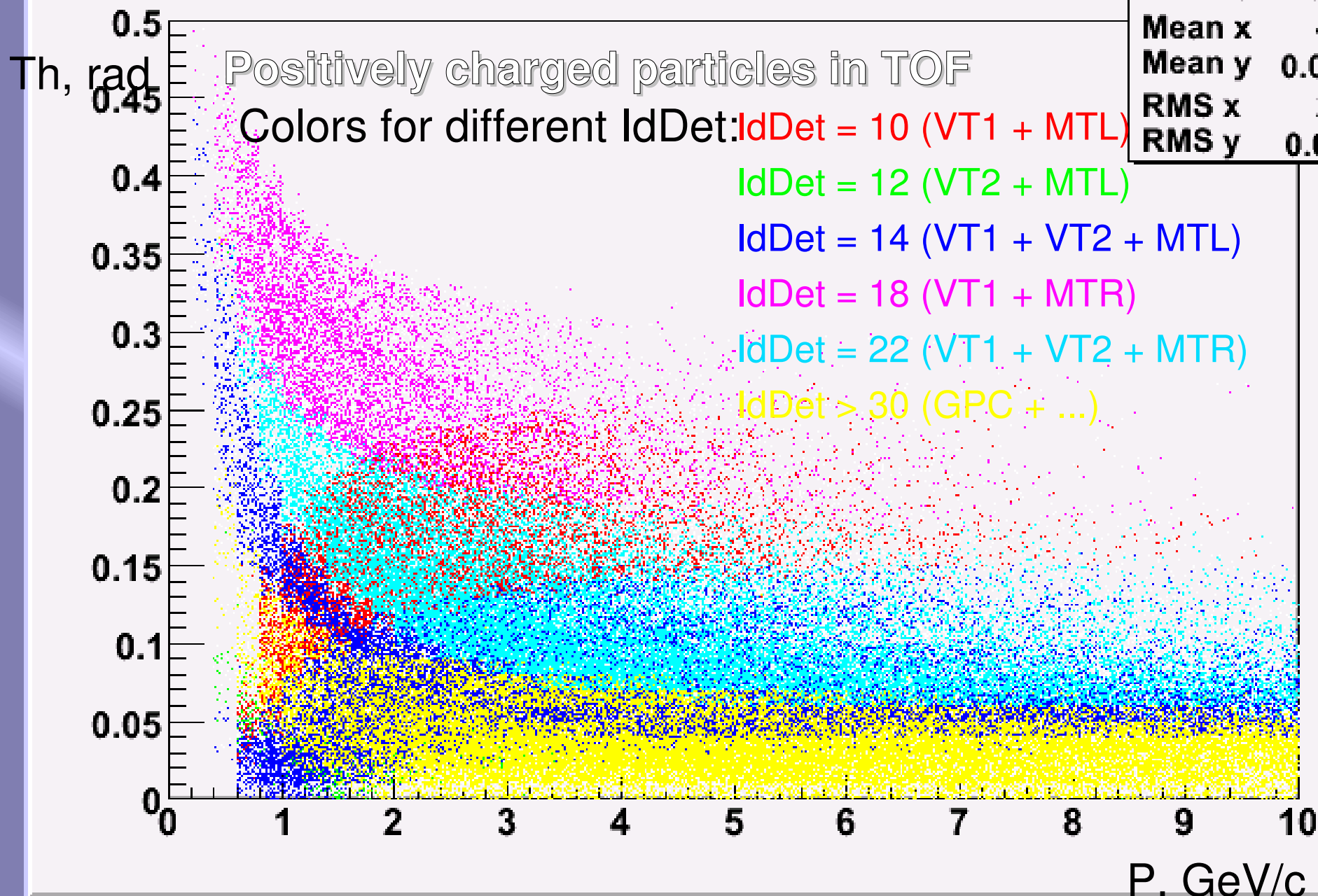
Entries 134738

Mean x 4.168

Mean y 0.09326

RMS x 2.433

RMS y 0.07161



# *07B production on LT and special runs*

Using the new NA61 software pre-release (**v1r3-1a**) the long target and the special runs have also been processed.

Batch outputs are in [/afs/cern.ch/na61/Production/Prod/07B/replica](#) and [/afs/cern.ch/na61/Production/Prod/07B/special](#)

The DSTs in DSPACK and ROOT formats can be found in

**LT:**

- DSPACK: [/castor/cern.ch/na61/07/T2K/prod/07B/replica/DSPACK](#)
- ROOT: [/castor/cern.ch/na61/07/T2K/prod/07B/replica/ROOT](#)  
(and in [/afs/cern.ch/na61/Data/07/T2K/prod/07B/replica](#))

**special (including target-out) runs:**

- DSPACK: [/castor/cern.ch/na61/07/T2K/prod/07B/special/DSPACK](#)
- ROOT: [/castor/cern.ch/na61/07/T2K/prod/07B/special/ROOT](#)

# *LT runs from 07B production*

Total number of events processed **234989**

Total number of events after Cut1 221980 (0.944640)

Total number of events after Cut2 102165 (0.434765) (0.460244)

Total number of events after Cut3 91150 (0.387890) (0.892184)

Total number of events after Cut4 88001 (0.374490) (0.965453)

Total number of tracks analysed **466795** (multiplicity 5.304428)

Total number of tracks after Cut1 379014 (0.811950)

Total number of tracks after Cut2 373285 (0.799677) (0.984884)

Total number of tracks after Cut3 288141 (0.617275) (0.771906)

Total number of tracks after Cut4 259885 (0.556743) (0.901937)

Total number of tracks after Cut5 **248328** (0.531985) (0.955530)

... among those 148933 are positive (0.599743)

... among those 99395 are negative (0.400257)

# *Software pre-release & 07C production*

The NA61 software pre-release (**v1r3-1a**) was used to run a new test production **07C** on the 2C runs (Standard Settings) runs without the GAP TPC.

Currently this pre-release corresponds to the “**verynew**” level.

Batch print-output is in </afs/cern.ch/na61/Production/Prod/07C>

The output of this production can be found in

- DSPACK format: </castor/cern.ch/na61/07/T2K/prod/07C/DSPACK>
- ROOT mDST format: </castor/cern.ch/na61/07/T2K/prod/07C/ROOT>  
(and in </afs/cern.ch/na61/Data/07/T2K/prod/07C>)

The following corrections have been made w.r.t. 07B:

- ‘**GPC=OFF**’ in the Setup file
- correct **track\_tof** structure
- additional variable - **var\_tmean** - on the ROOT mDSTs

# *2C runs without the GAP TPC in 07C*

Total number of events processed **216880**

Total number of events after Cut1 168830 (0.778449)

Total number of events after Cut2 110550 (0.509729) (0.654801)

Total number of events after Cut3 99221 (0.457493) (0.897521)

Total number of events after Cut4 88180 (0.406584) (0.888723)

Total number of tracks analysed **331954** (multiplicity 3.764504)

Total number of tracks after Cut1 331954 (1.000000)

Total number of tracks after Cut2 331639 (0.999051) (0.999051)

Total number of tracks after Cut3 304045 (0.915925) (0.916795)

Total number of tracks after Cut4 299144 (0.901161) (0.983881)

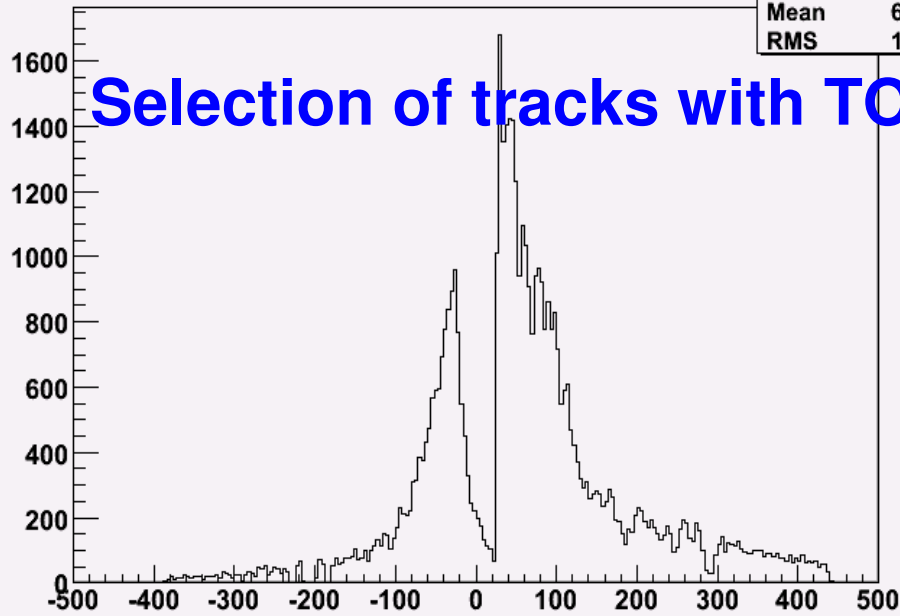
Total number of tracks after Cut5 **294307** (0.886590) (0.983831)

... among those 187987 are positive (0.638745)

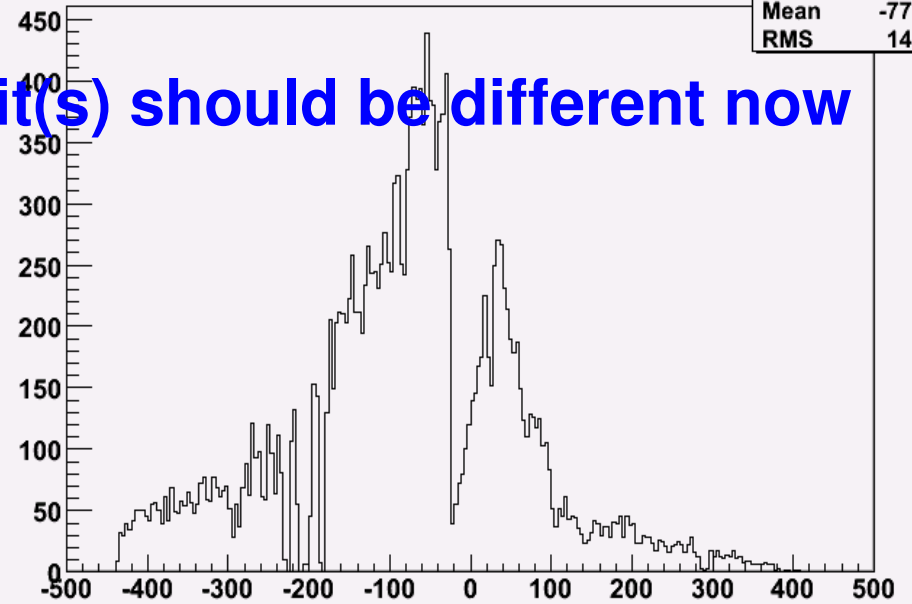
... among those 106320 are negative (0.361255)

# TOFs in 07C production

TofX (Pos)

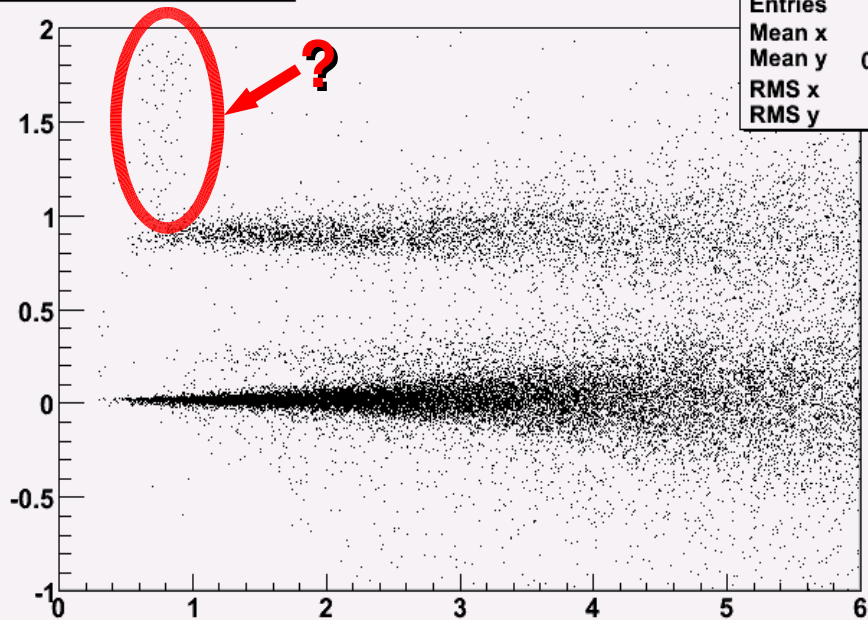


TofX (Neg)

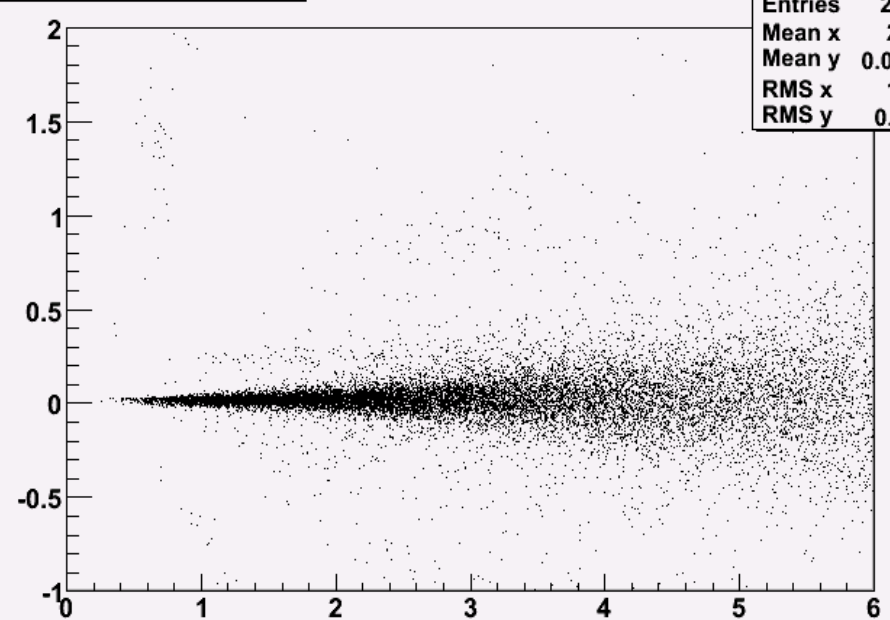


Selection of tracks with TOF hit(s) should be different now

TofM2 vs Mom (Pos)



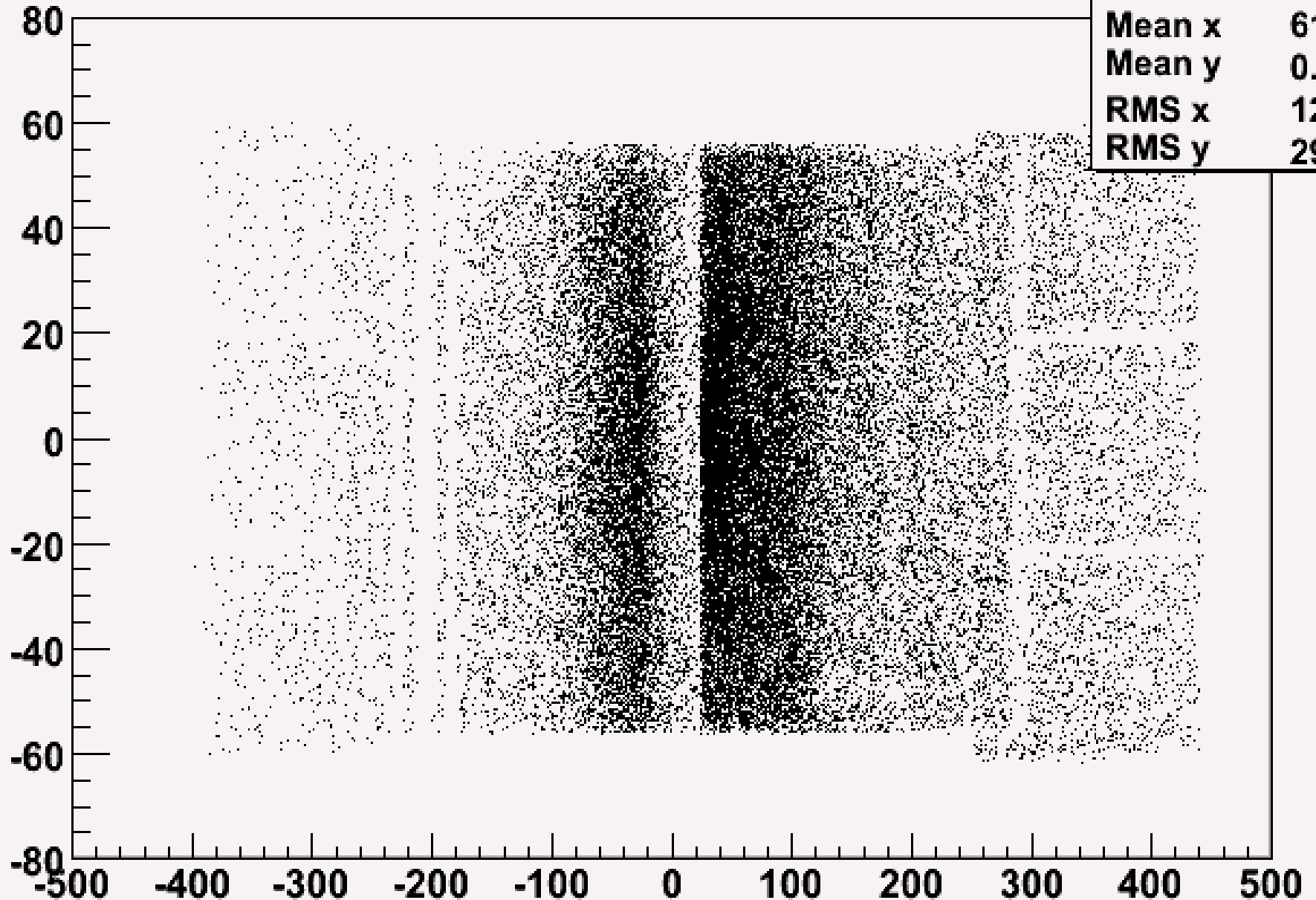
TofM2 vs Mom (Neg)





# *TOFs in 07C production*

Tof Y vs X pos

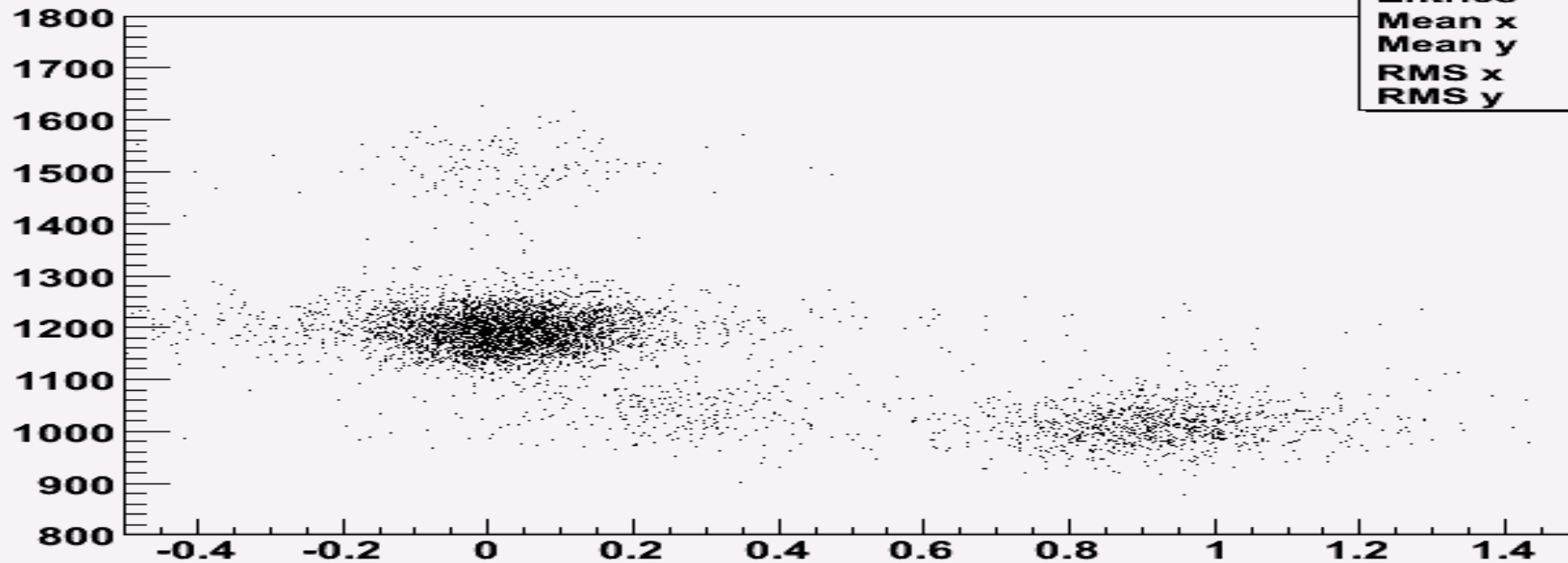


hTofYvsXpos

Entries	50611
Mean x	61.39
Mean y	0.228
RMS x	126.6
RMS y	29.95

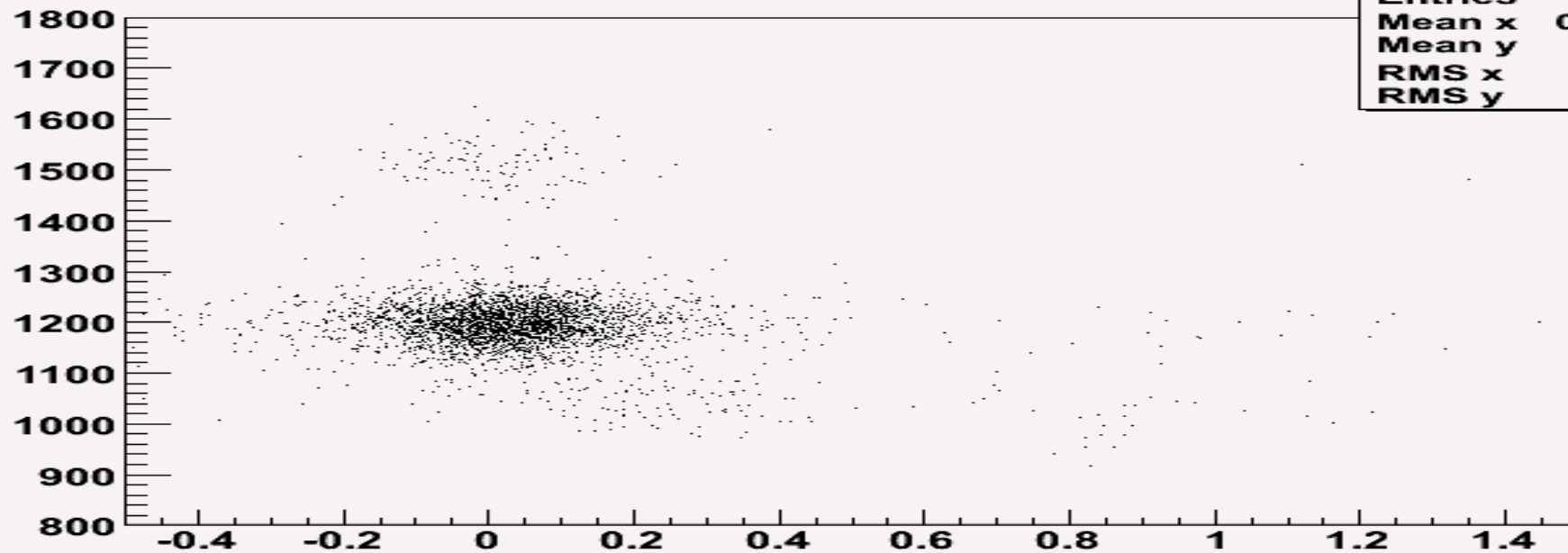
# *dEdx vs M2 plots from 2C runs*

**M2 vs Dedx (pos) 5-6 GeV/c**



hTofDedxPos3	
Entries	5503
Mean x	0.2069
Mean y	1161
RMS x	0.376
RMS y	103.9

**M2 vs Dedx (neg) 5-6 GeV/c**

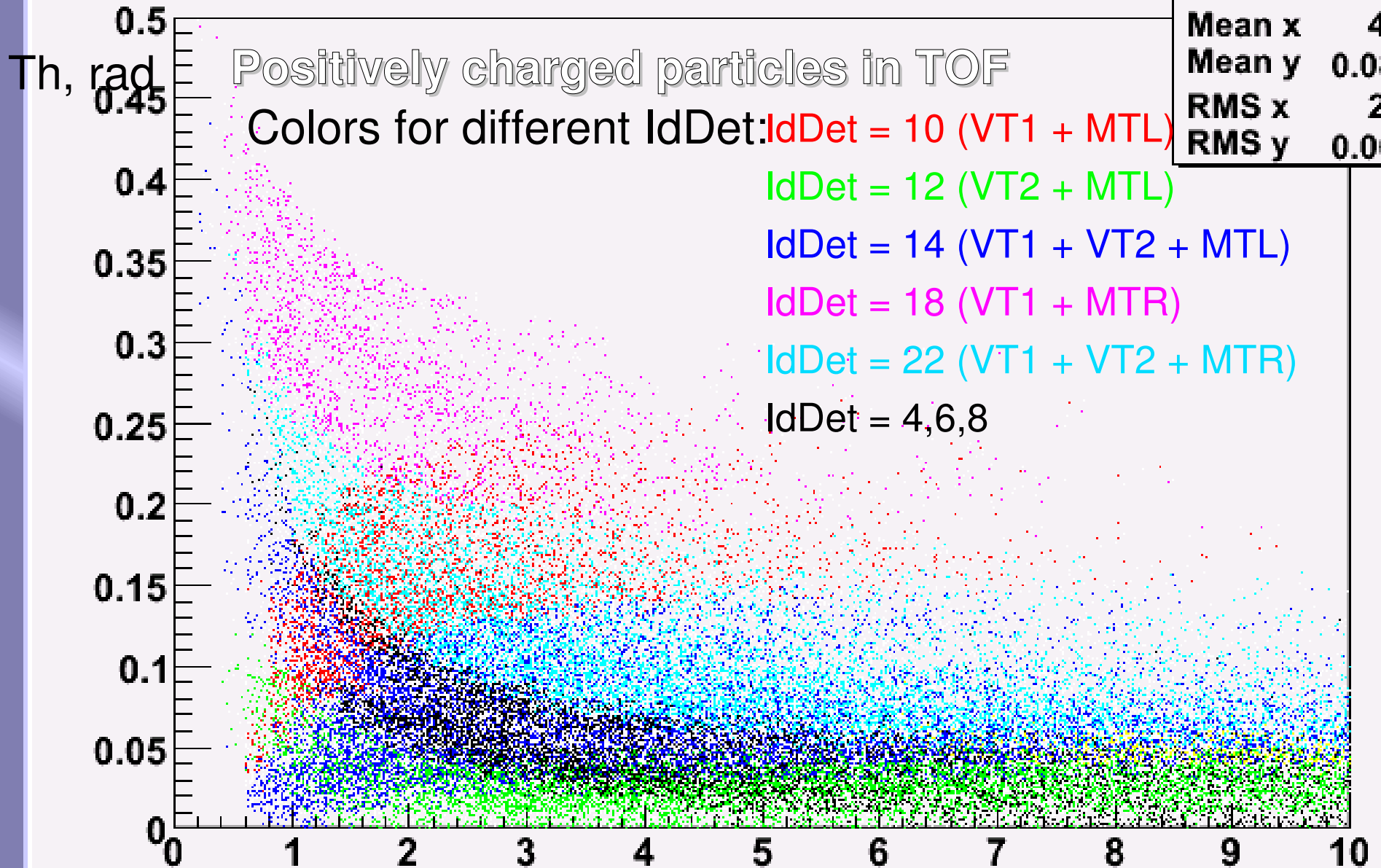


hTofDedxNeg3	
Entries	3290
Mean x	0.04402
Mean y	1201
RMS x	0.1758
RMS y	78.24

# *T2K-related plot from 2C 07C runs*

**Momentum vs Theta Plot (TOF Pos)**

hMomThetaTofPos	
Entries	50611
Mean x	4.394
Mean y	0.08348
RMS x	2.484
RMS y	0.06665



For the runs without the GAP TPC

P, GeV/c

# *07D and 07E productions*

After some improvements and bug fixes the NA61 software pre-release **v1r3-1a** was used to run more test productions **07D** and **07E** on the 2C runs (Standard Settings) runs without the GAP TPC.

Batch print-output is in </afs/cern.ch/na61/Production/Prod/07E>

The output of this production can be found in

- DSPACK format: </castor/cern.ch/na61/07/T2K/prod/07E/DSPACK>
- ROOT mDST format: </castor/cern.ch/na61/07/T2K/prod/07E/ROOT>  
(and in </afs/cern.ch/na61/Data/07/T2K/prod/07E>)

The following corrections have been made w.r.t. 07C:

- treatment of the detector geometry in the Setup file
- correction in the number of **dedx** points
- bug fix in the BPD miniclient (position of the BPD vertex)

# *2C runs without the GAP TPC in 07E*

Total number of events processed **216873**

Total number of events after Cut1 168819 (0.778423)

Total number of events after Cut2 110998 (0.511811) (0.657497)

Total number of events after Cut3 99667 (0.459564) (0.897917)

Total number of events after Cut4 89221 (0.411397) (0.895191)

Total number of tracks analysed **334074** (multiplicity 3.744343)

Total number of tracks after Cut1 334074 (1.000000)

Total number of tracks after Cut2 333741 (0.999003) (0.999003)

Total number of tracks after Cut3 305929 (0.915752) (0.916666)

Total number of tracks after Cut4 301129 (0.901384) (0.984310)

Total number of tracks after Cut5 **296558** (0.887702) (0.984820)

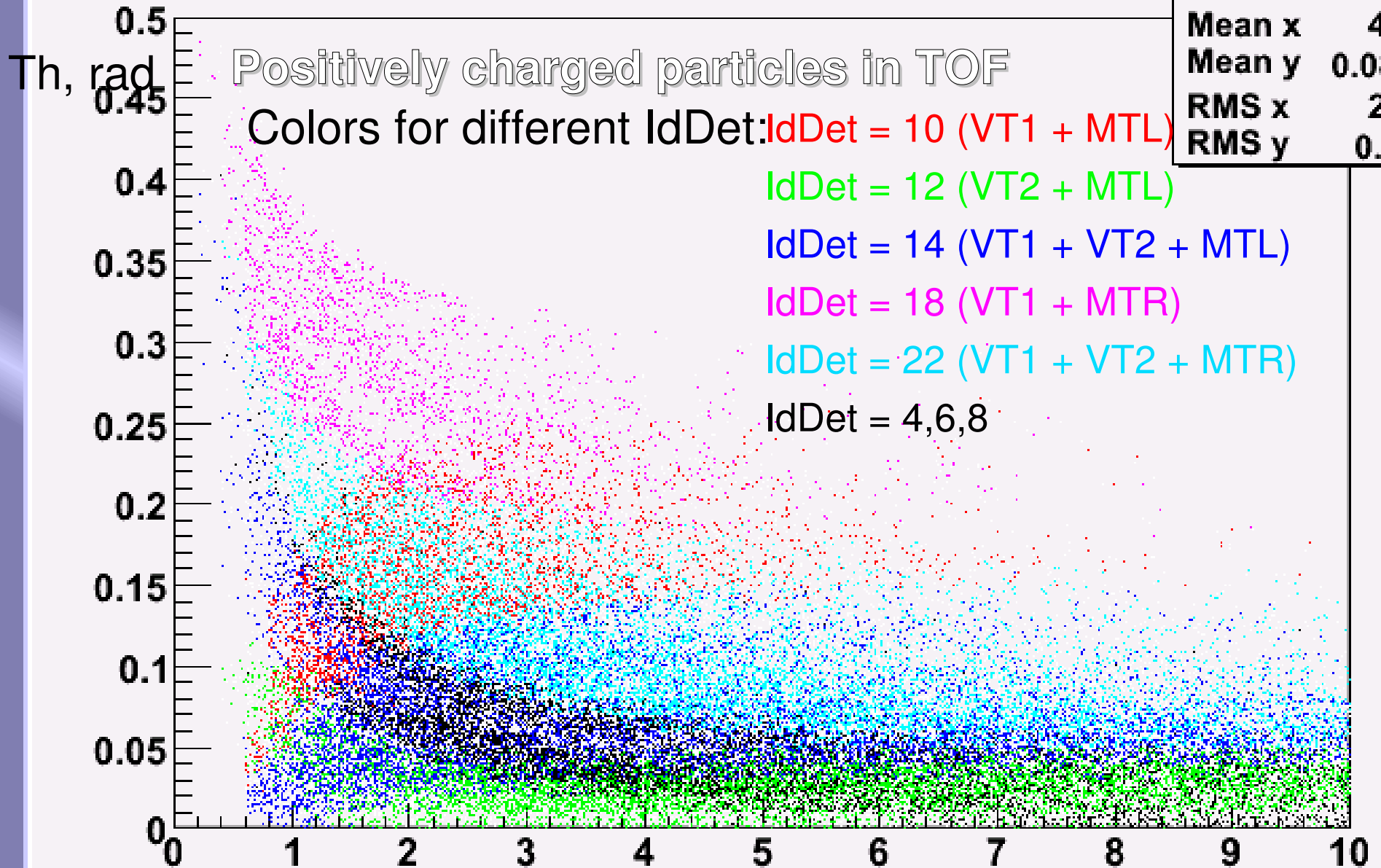
... among those 189740 are positive (0.639807)

... among those 106818 are negative (0.360193)

# *T2K-related plot from 2C 07C runs*

**Momentum vs Theta Plot (TOF Pos)**

hMomThetaTofPos	
Entries	51792
Mean x	4.415
Mean y	0.08298
RMS x	2.492
RMS y	0.0671



For the runs without the GAP TPC

P, GeV/c

# Summary

Several productions on the NA61 2007 data (07A-07E) have been performed using software (pre-)releases v1r2 and v1r3-1(a) on thin target 2C (Standard Settings), replica target and special runs with and without the GAP TPC

Clear improvements in the reconstructed data quality with time

Further checks needed before we could make sure that the GAP TPC is fully integrated into the reconstruction chain

We are very close to the final production on the 2007 data

Can be used to extract first physics results from NA61 2007 data...