alignment etc.

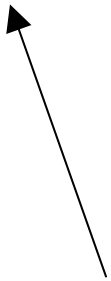
- AliTRDalignment class
- experiences with official alignment procedure
- standalone TRD tracking

- calibration and alignment variables

AliTRDalignment class – what it contains

Double_t fSm[18][6]; **// supermodule data**

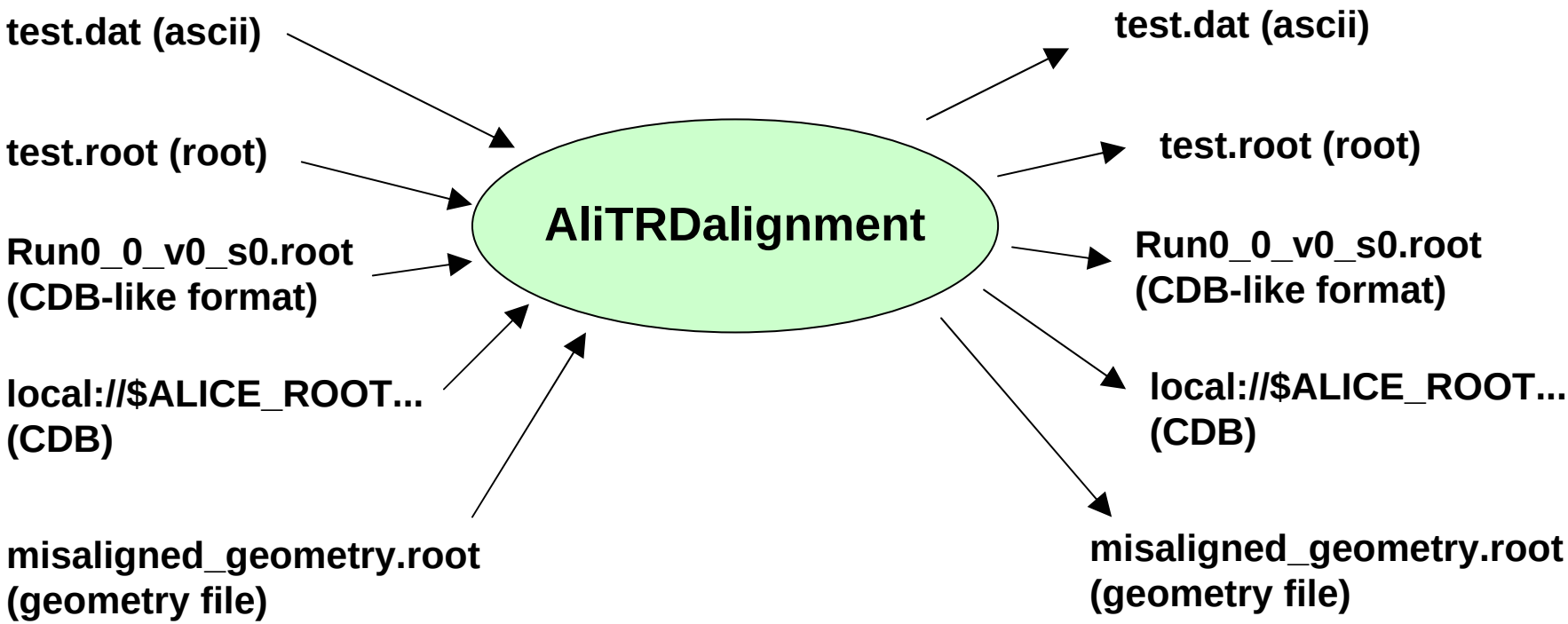
Double_t fCh[540][6]; **// chamber data**



0. translation in phi
1. translation in z
2. translation in r
3. rotation around phi
4. rotation around z
5. rotation around r

AliTRDalignment class – what it can do

... it can read and write



AliTRDalignment class – what it can do

... it can generate random misalignment

SetFull();

SetResidual();

SetZero();

AliTRDalignment class – what it can do

... it can report

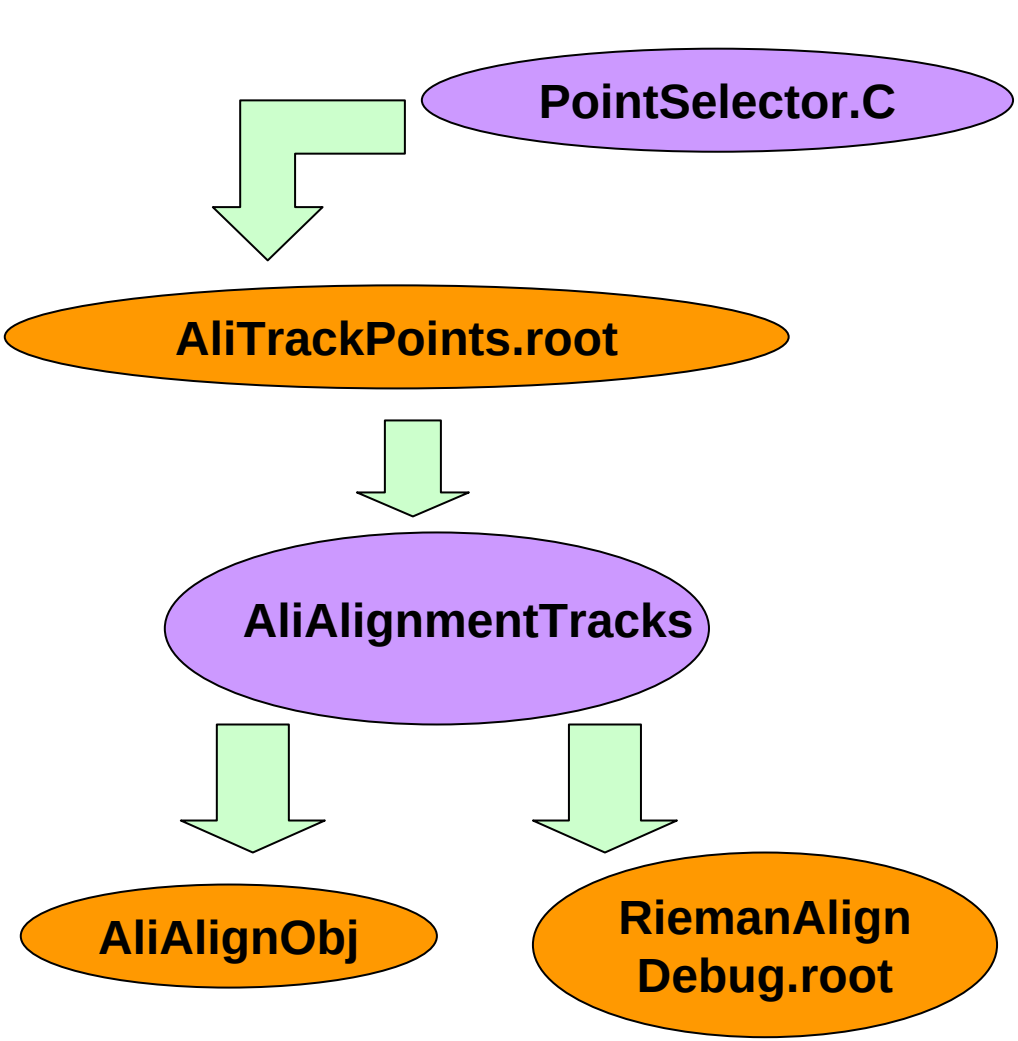
```
root [10] a.Print()
```

```
  0     0.2690   -0.5138    0.2056     0.00036   0.18153   0.02015       0  TRD/sm00
  1     0.2093    0.0433   -0.0956    -0.01013  -0.08435   0.02154       0  TRD/sm01
  2    -0.0164    0.4150    0.0587     0.01562   0.04152  -0.01008       0  TRD/sm02
...
 16    -0.4747   -0.9707    0.2785     0.03257   0.07802   0.02094       0  TRD/sm16
 17     0.0558    0.0788    0.1502    -0.02323   0.09978  -0.02882       0  TRD/sm17
  0     0.1031    0.0559    0.1690    -0.05422   0.06046  -0.04293   18432  TRD/sm00/st0/pl0
  1    -0.1313   -0.0080   -0.2610     0.01584  -0.04645   0.03821   20480  TRD/sm00/st0/pl1
...
538    -0.0380   -0.1089   -0.0883    -0.07318  -0.04837  -0.02477   26713  TRD/sm17/st4/pl4
539     0.0140    0.0494    0.0277    -0.00398   0.05137  -0.07303   28761  TRD/sm17/st4/pl5
```

```
root [10] a.PrintRMS()
```

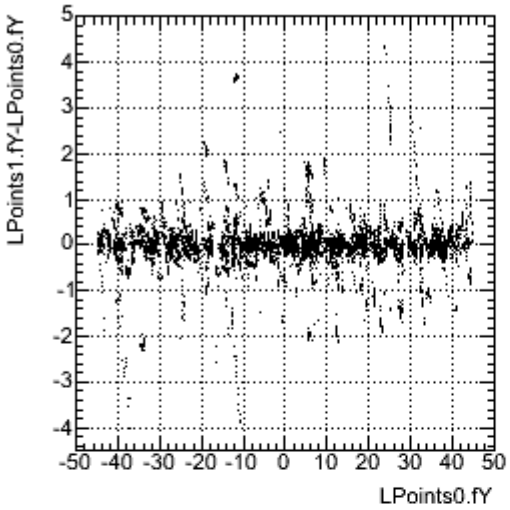
```
      0.2496    0.3582    0.2488     0.02276   0.08786   0.02579  supermodule rms
      0.1029    0.1000    0.1032     0.05817   0.05850   0.03968  chamber rms
```

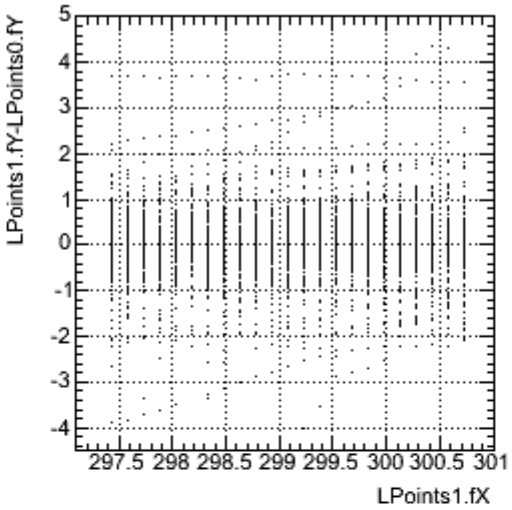
experiences with the official alignment procedure

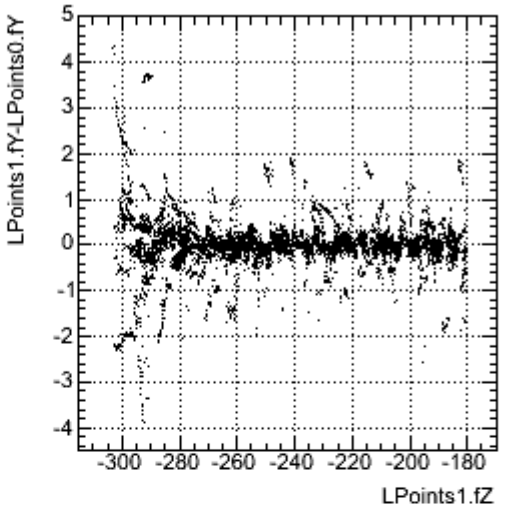


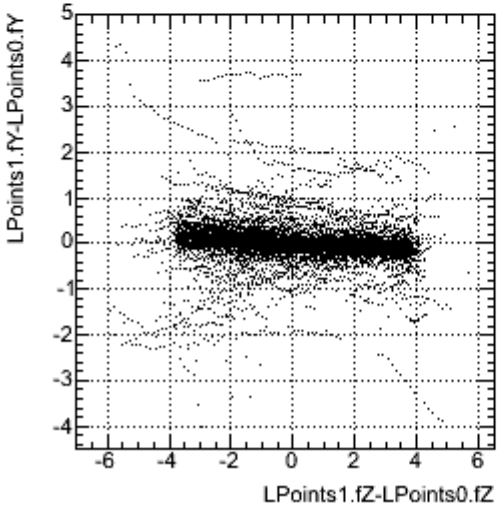
- it works, in principle
- reasonable residuals
- sometimes wrong recommendations as where to shift (AliAlignObj)
- poor resolution (1.2 mm in phi)

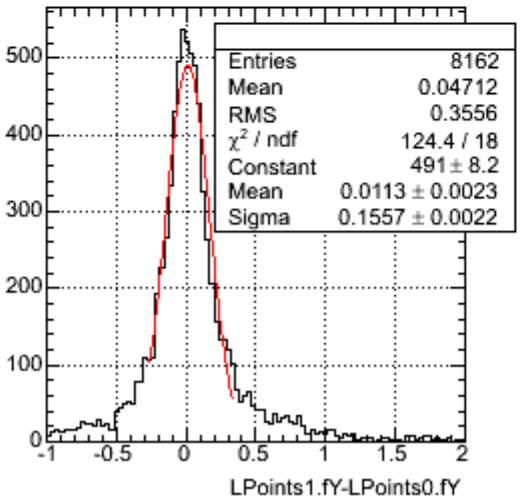
official alignment procedure AliTrackResidualsFast, ideal











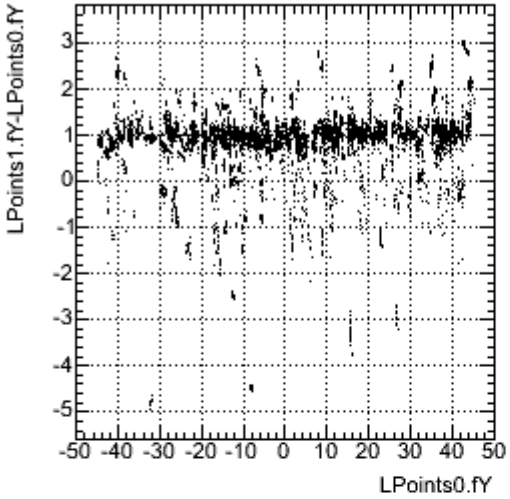
AliTrackPoints.root

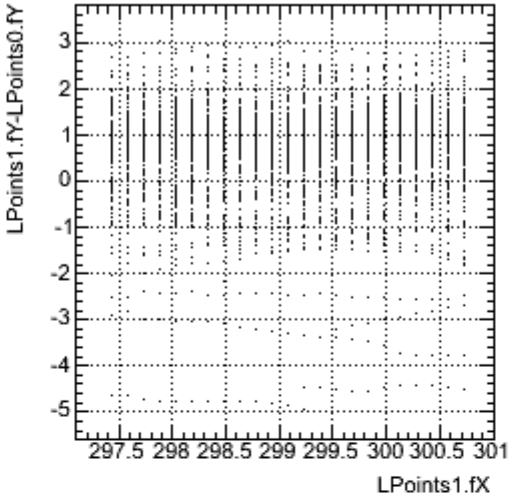
Aligning volumes
18436 (TRD/sm00/st4/pl0)
to reference volumes
14354 (TPC/EndcapC/Sector1/InnerChamber)
16402 (TPC/EndcapC/Sector1/OuterChamber)

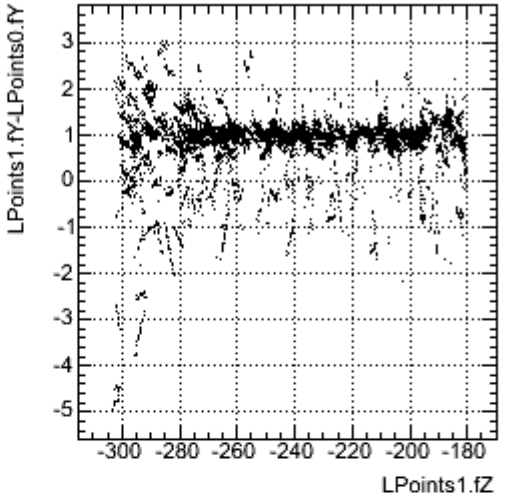
Result

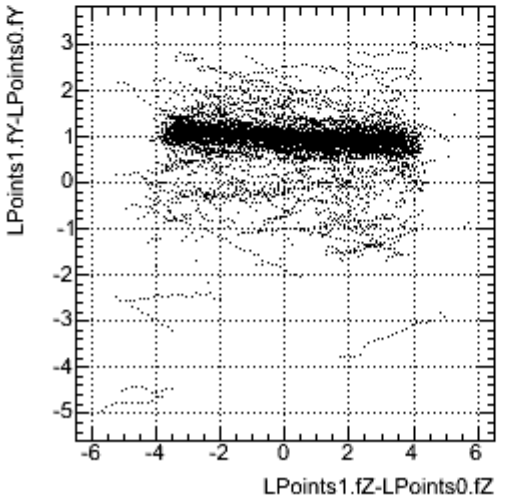
shift in phi	-0.335
shift in r	0.017
shift in z	-0.780
tilt in phi	-0.0862
tilt in r	0.0632
tilt in z	0.0418

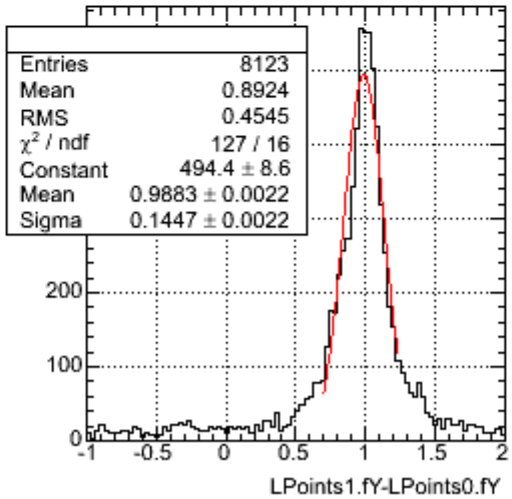
official alignment procedure
AliTrackResidualsFast, sm00 shifted by 1 cm











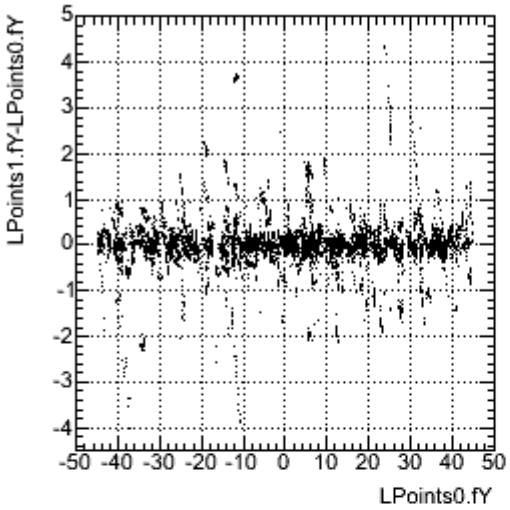
AliTrackPoints.root

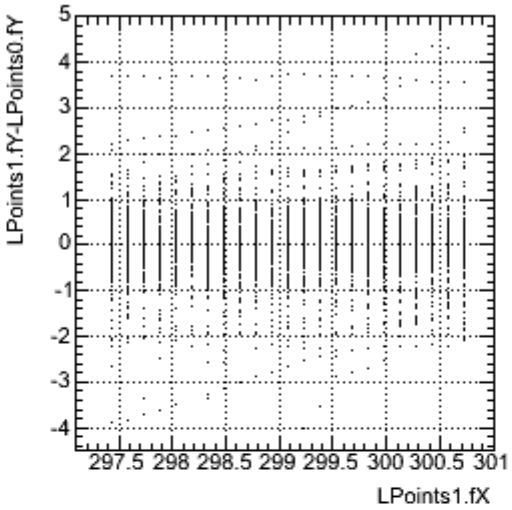
Aligning volumes
18436 (TRD/sm00/st4/pl0)
to reference volumes
14354 (TPC/EndcapC/Sector1/InnerChamber)
16402 (TPC/EndcapC/Sector1/OuterChamber)

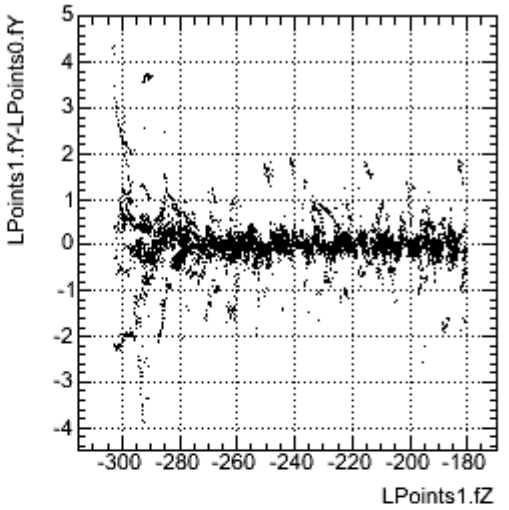
Result

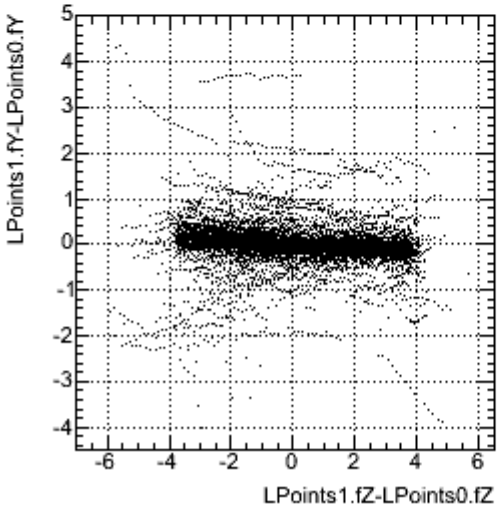
shift in phi	1.747
shift in r	0.556
shift in z	5.159
tilt in phi	0.6587
tilt in r	0.3829
tilt in z	-0.1141

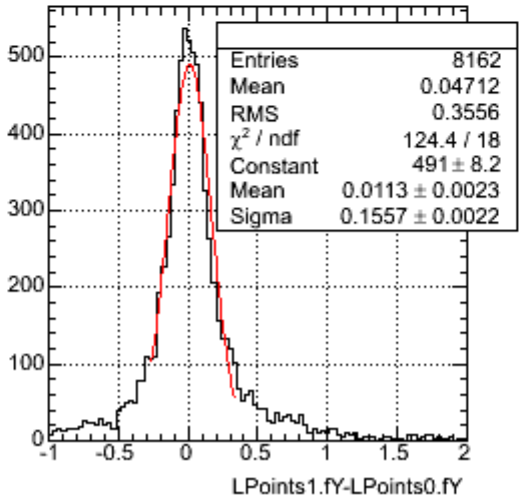
official alignment procedure
AliTrackResidualsLinear, ideal











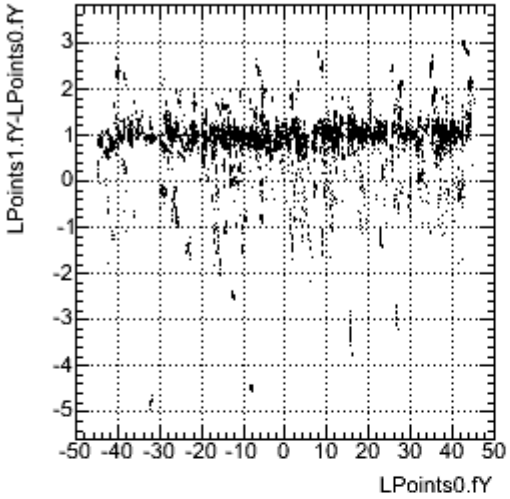
AliTrackPoints.root

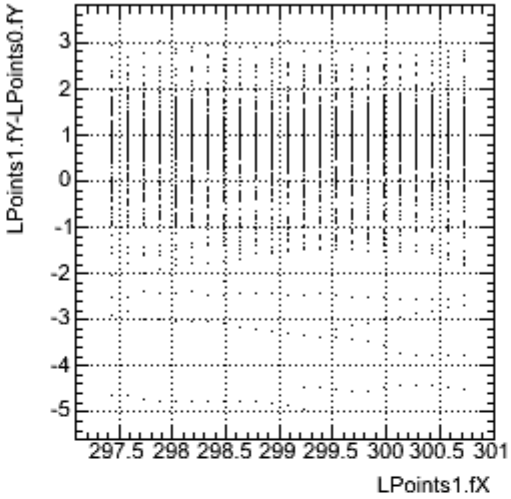
Aligning volumes
18436 (TRD/sm00/st4/pl0)
to reference volumes
14354 (TPC/EndcapC/Sector1/InnerChamber)
16402 (TPC/EndcapC/Sector1/OuterChamber)

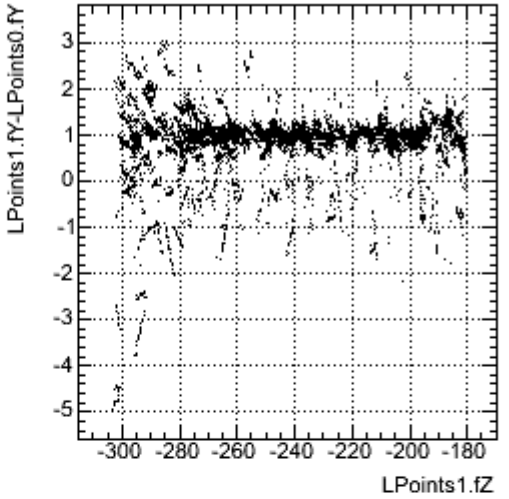
Result

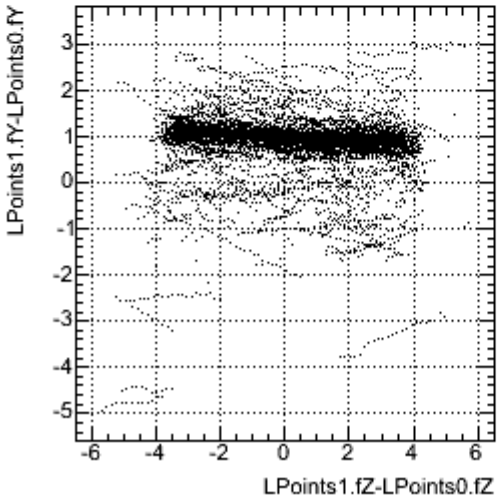
shift in phi	0.498
shift in r	1.083
shift in z	-0.817
tilt in phi	-0.0901
tilt in r	0.2185
tilt in z	0.0427

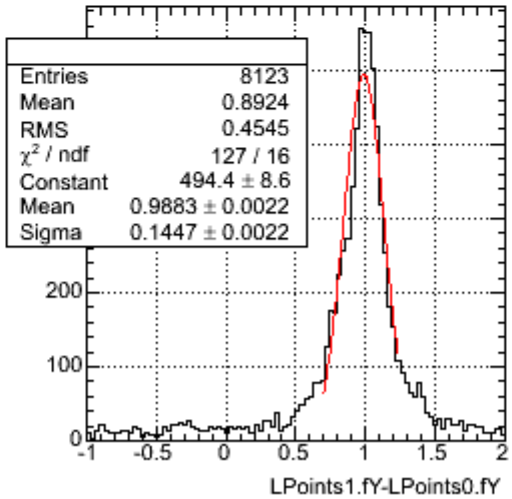
official alignment procedure
AliTrackResidualsLinear, sm00 shifted by 1 cm











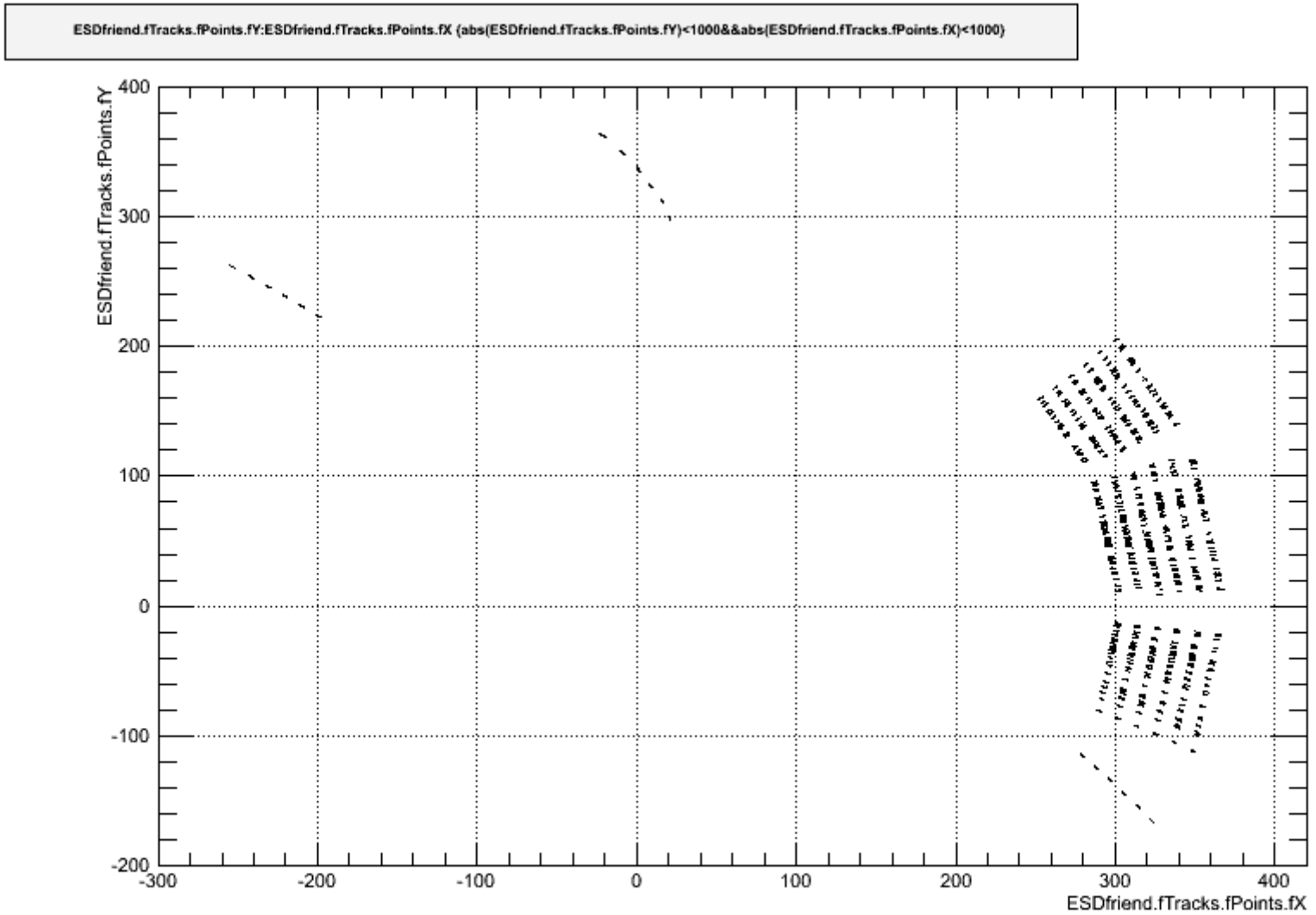
AliTrackPoints.root

Aligning volumes
18436 (TRD/sm00/st4/pl0)
to reference volumes
14354 (TPC/EndcapC/Sector1/InnerChamber)
16402 (TPC/EndcapC/Sector1/OuterChamber)

Result

shift in phi	2.815
shift in r	2.016
shift in z	4.927
tilt in phi	0.6320
tilt in r	0.6170
tilt in z	-0.1149

on the way to analyze cosmics – standalone TRD tracking



Calibration and alignment variables, part 1

parameter	source	sim	rec	nr	size	total MB	upd.frq.	vol/h
- position of supermodule (cm,deg)	survey	OK	OK	18x6	float	0.0004	year	0
- position of chamber (cm,deg)	analysis of 1e5 pp events	OK	OK	540x6	float	0.012	hour	0.012
- pad drift velocity factor	analysis of 1e8 pp events	OK	OK	1.2e6	ushort	2.3	year	0.0032
- pad T0 (timebin)	analysis of 1e8 pp events	OK	OK	1.2e6	ushort	2.3	year	0.0032
- pad gain factor	analysis of 1e8 pp events	OK	OK	1.2e6	ushort	2.3	year	0.0032
- pad resp. funct. width (pad)	analysis of 1e8 pp events	OK	?	1.2e6	ushort	2.3	year	0.0032
- chamber drift vel. (cm/timebin)	analysis of 1e5 pp events	OK	OK	540	float	0.0021	hour	0.0021
- chamber drift T0 (timebin)	analysis of 1e5 pp events	OK	OK	540	float	0.0021	hour	0.0021
- chamber gain	analysis of 1e5 pp events	OK	OK	540	float	0.0021	hour	0.0021
- dedx histogram	offline analysis or sim.	--	OK	55	hist	0.052	year	0
- max timebin histograms	offline analysis or sim.	--	OK	55	hist	0.052	year	0
- status byte of pad	config summary file	OK	?	1.2e6	char	1.1	run	1.1
- number of timebins	config summary file	OK	OK	1	int	0	run	0
- tail cancelation tau1	config summary file	--	--	1	int	0	run	0
- tail cancelation tau2	config summary file	--	--	1	int	0	run	0
- tail cancelation amplitude	config summary file	--	--	1	int	0	run	0
- pedestal	config summary file	--	--	1	int	0	run	0
- configuration id	config summary file	--	--	1024	char	0.001	run	0
- gain table id	config summary file	--	--	1024	char	0.001	year	0

Calibration and alignment variables, part 2

- status byte of chamber	DCS Archive DB	OK	?	540	char	0.00051	minute	0.031
- pretrigger configuration	DCS Archive DB	--	--	1024	char	0.001	run	0.001
- goofy: HV	DCS Archive DB	--	--	1	float	0	minute	
- goofy: peak1 pos	DCS Archive DB	--	--	1	float	0	minute	
- goofy: peak2 pos	DCS Archive DB	--	--	1	float	0	minute	
- goofy: peak1 area	DCS Archive DB	--	--	1	float	0	minute	
- goofy: peak2 area	DCS Archive DB	--	--	1	float	0	minute	
- goofy: temp1	DCS Archive DB	--	--	1	float	0	minute	
- goofy: temp2	DCS Archive DB	--	--	1	float	0	minute	0.0034
- goofy: pressure	DCS Archive DB	--	--	1	float	0	minute	
- goofy: velocity	DCS Archive DB	--	?	1	float	0	minute	
- goofy: gain1	DCS Archive DB	--	--	1	float	0	minute	
- goofy: gain2	DCS Archive DB	--	--	1	float	0	minute	
- goofy: CO2	DCS Archive DB	--	--	1	float	0	minute	
- goofy: N2	DCS Archive DB	--	--	1	float	0	minute	
- O2 content in gas	DCS Archive DB	--	--	1	float	0	minute	
- chamber gas overpressure	DCS Archive DB	--	--	1	float	0	minute	
- environment temperature	DCS Archive DB	--	--	540	float	0.0021	minute	0.126
- HV chamber anode currents (mon)	DCS Archive DB	--	--	540	float	0.0021	minute	0.126
- HV chamber drift currents (mon)	DCS Archive DB	--	--	540	float	0.0021	minute	0.126
- HV chamber anode voltages (mon)	DCS Archive DB	--	--	540	float	0.0021	minute	0.126
- HV chamber drift voltages (mon)	DCS Archive DB	--	--	540	float	0.0021	minute	0.126
- ADC clock phase in respect to TTC	DCS Archive DB			1	float	0	run	
- atmospheric pressure	DCS Archive DB	--	--	1	float	0	minute	
- luminosity	DCS Archive DB	--	--	1	float	0	minute	0.0006
- magnetic field	DCS Archive DB	con	con	1	float	0	minute	
total						10.4		1.80