TRD alignment related issues

Dariusz Miśkowiec (GSI)

- ***surveys***
- ***overlaps***
- ***tracklet covariance***

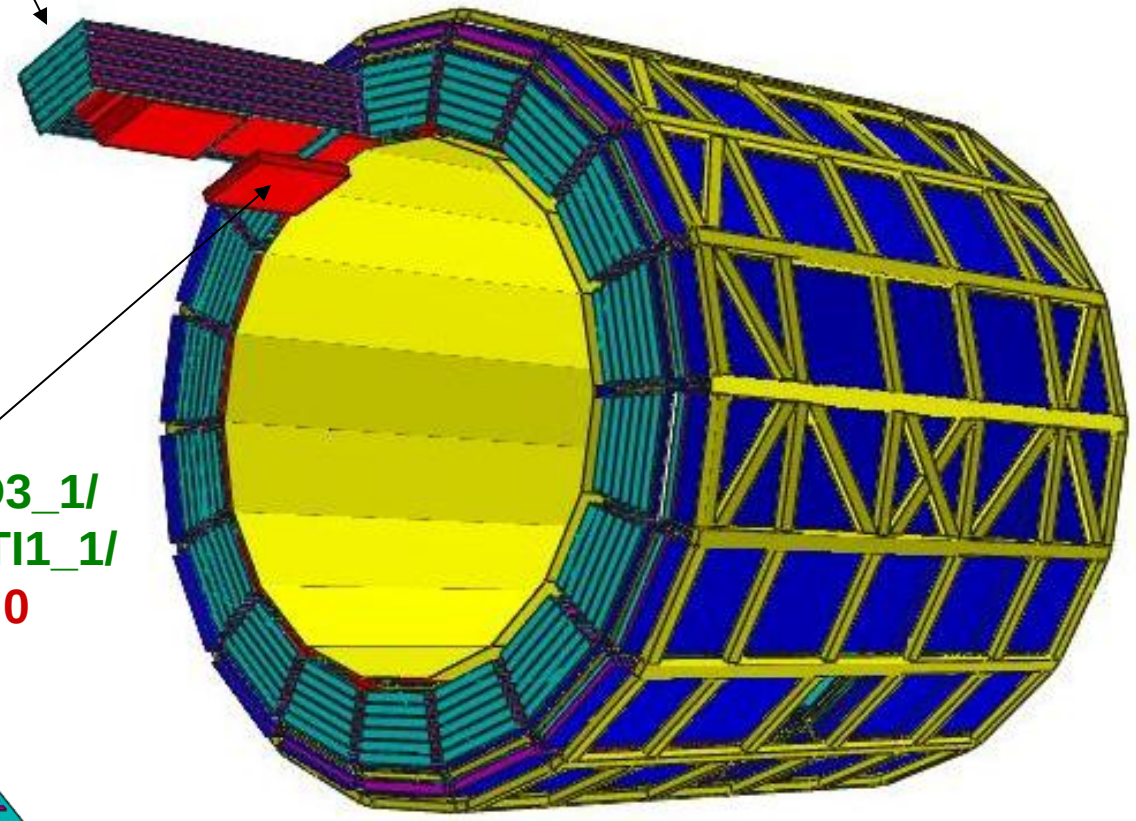
Brief history of TRD supermodules

2006	2007	2008	2009
SM I: caliper survey; insert Sec 8; survey		survey; cosmics; disass. CERN	repair GSI; ass. Münster
SM II	assembled in Münster; CERN	insert Sec 0; survey; cosmics; disass. CERN	repair GSI; ass. Münster; ins Sec
SM III	assembled in Münster; CERN test PS	repair CERN/GSI; cosmics Münster; CERN; insert Sec 7	
SM IV	assembled in Münster	repair CERN; insert Sec 9; survey; cosmics	
SM V	assembled in Münster	insert Sec 17; survey; cosmics	
SM VI		assembled in Münster	insert Sec 1

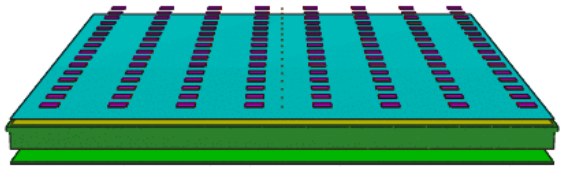
survey 2008

alignable volumes in TRD

18 TRD supermodules
like ALIC_1/B077_1/BSEGMO3_1/BTRD3_1
aka /TRD/sm03
aligned by survey



540 TRD chambers
like ALIC_1/B077_1/BSEGMO3_1/
BTRD3_1/UTR1_1/UTS1_1/UTI1_1/
UT18_1 aka /TRD/sm03/st3/pl0
aligned with tracks

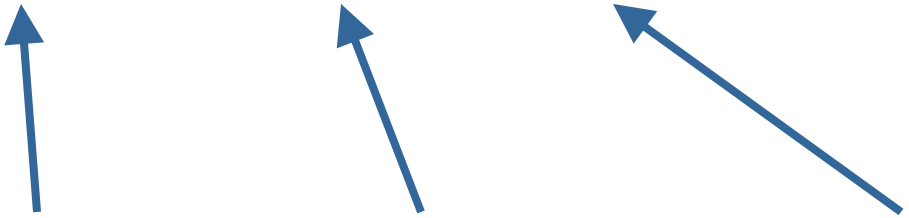


processing survey data with AliTRDalignment

alignment params of supermodule 08 deduced from Dec-2006 survey using aliroot from 2007

phi-shift	z-shift	r-shift	phi-rot	z-rot	r-rot
0.279	0.085	-2.224	0.000	0.000	0.000
±0.300	±0.300	±0.300	±0.000	±0.000	±0.000

(only translations)



phi: 0.3 cm to larger phi i.e. downward

z: 0.1 cm away from muon arm

r: 2.2 cm inward

processing survey data with AliTRDalignment

alignment params of supermodule 08 deduced from Dec-2006 survey using aliroot from 2008

phi-shift	z-shift	r-shift	phi-rot	z-rot	r-rot
0.279	0.085	-1.554	0.000	0.000	0.000
±1.000	±1.000	±1.000	±0.000	±0.000	±0.000

(only translations)

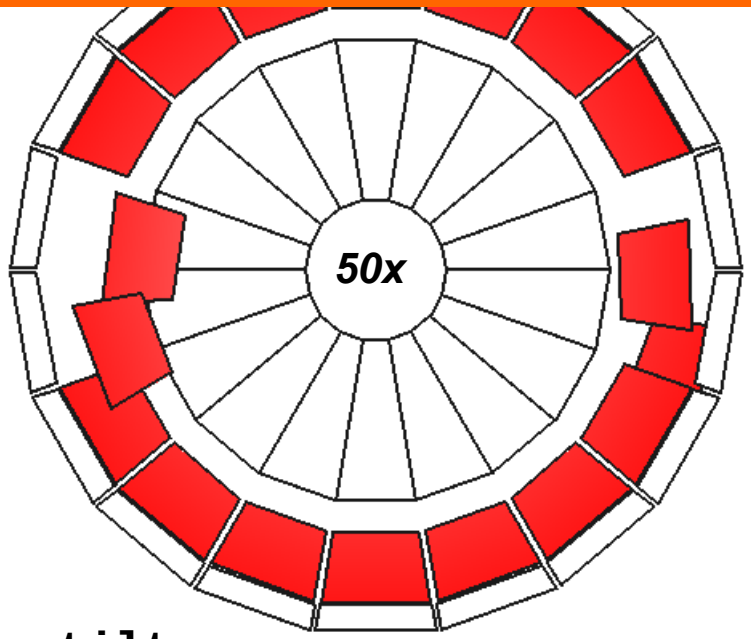
phi: 0.3 cm to larger phi i.e. downward

z: 0.1 cm away from muon arm

r: 1.6 cm inward

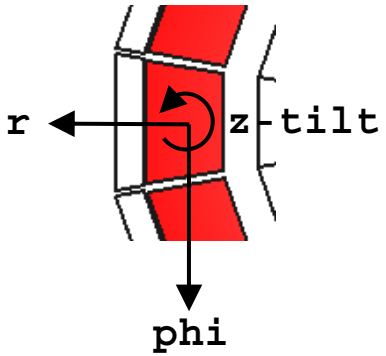
geometry modification partly absorbs the r-shift

TRD survey June 2008

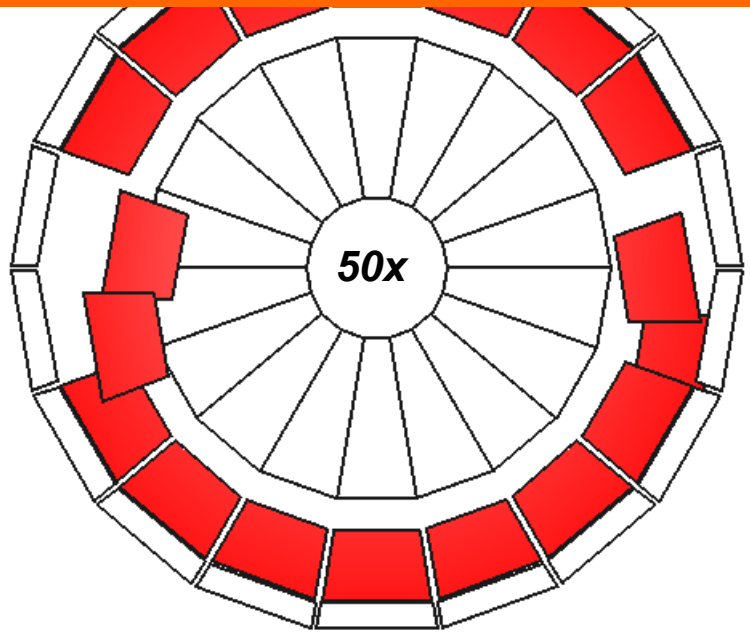


Only A-side measured
Results translated into shifts/tilts
Only shifts and z-tilt allowed
Shifts in cm, tilts in degrees

SM	phi-shift	z-shift	r-shift	z-tilt
00	-1.196	-0.308	-0.510	-0.168
	±0.071	±0.071	±0.071	±0.089
08	0.510	-0.260*	-1.453	0.040
	±0.071	±0.071	±0.071	±0.089
09	0.675	0.100	-0.815	0.220
	±0.085	±0.082	±0.084	±0.111
17	-0.997	-0.750	0.259	-0.208
	±0.085	±0.082	±0.084	±0.111

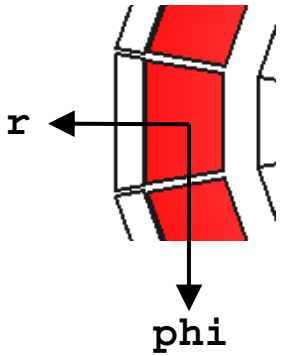


TRD survey June 2008



Only A-side measured
Results translated into shifts
Only shifts allowed
Shifts are in cm

SM	phi-shift	z-shift	r-shift
00	-1.197	-0.307	-0.510
	±0.071	±0.071	±0.071
08	0.510	-0.260*	-1.453
	±0.071	±0.071	±0.071
09	0.628	0.100	-0.854
	±0.082	±0.082	±0.082
17	-0.953	-0.750	0.223
	±0.082	±0.082	±0.082



for comparison, SM08 survey Dec 2006

```
Only A-side measured
Only shifts allowed
Shifts in cm, tilts in degrees

SM  phi-shift   z-shift    r-shift   z-tilt
-----------------------------------------


08    0.279      0.085     -1.554
```

→surveys 2006 and 2008 agree within the specified resolution
→displacements by ~1 cm observed

fighting
overlaps

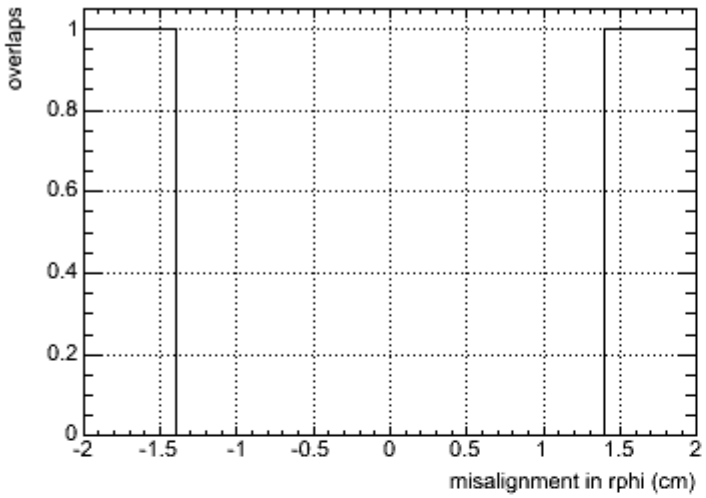
fighting TRD overlaps

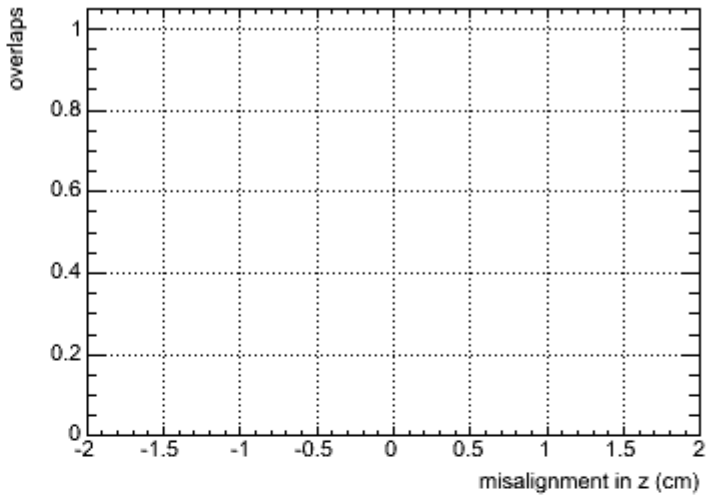
- ***in principle, truncated gaussian OK, but not below the realistic misalignment***

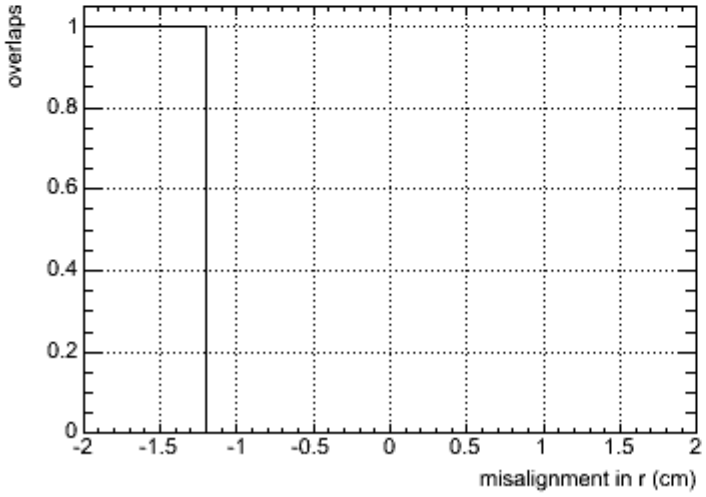
- ***overlap detection improved in root 521-04 (see next 2 slides) → overlaps now occur as soon as we move a volume***

- ***misalignments visible in the survey already produce overlaps in geometry***

TRD overlaps in aliroot 4-16-Rev-05 root 521-alice-01 and before

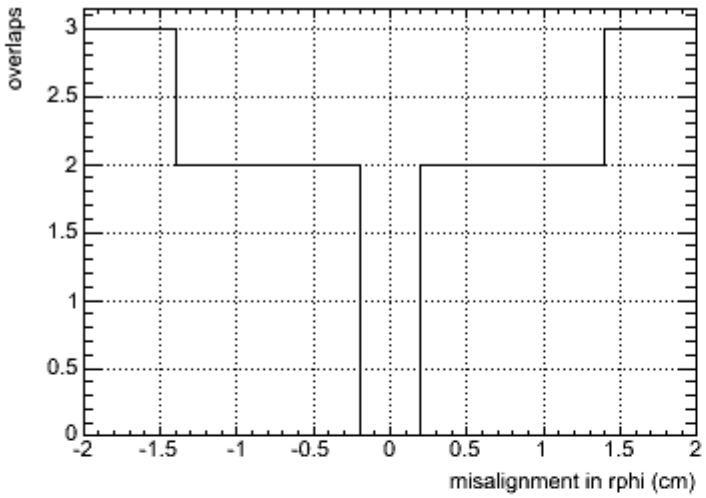


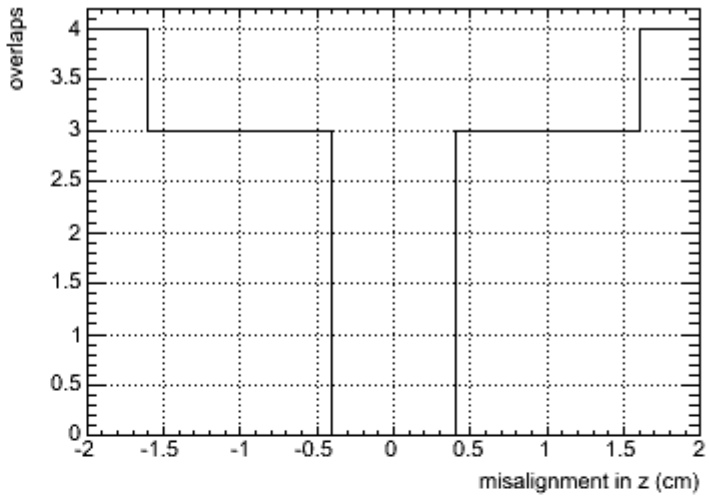


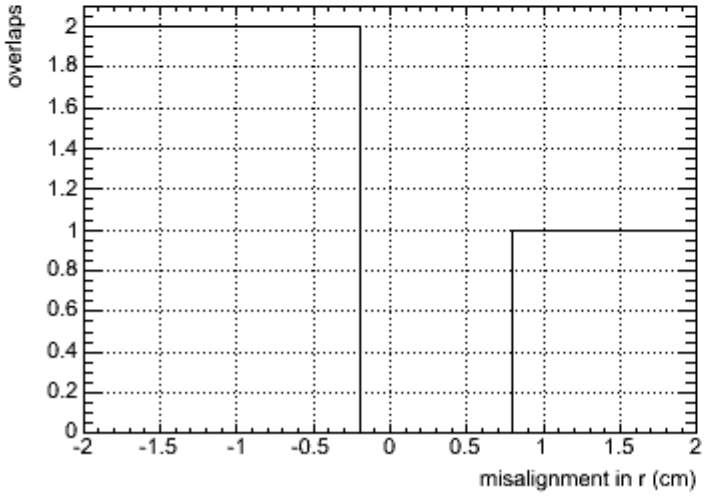


/ALIC_1/B077_1/BSEGMO0_1/BTRD0_1/UTR1_1/UTS1_1/UTI1_1/UT12_1

TRD overlaps in aliroot 4-16-Rev-05 root 521-04 and after

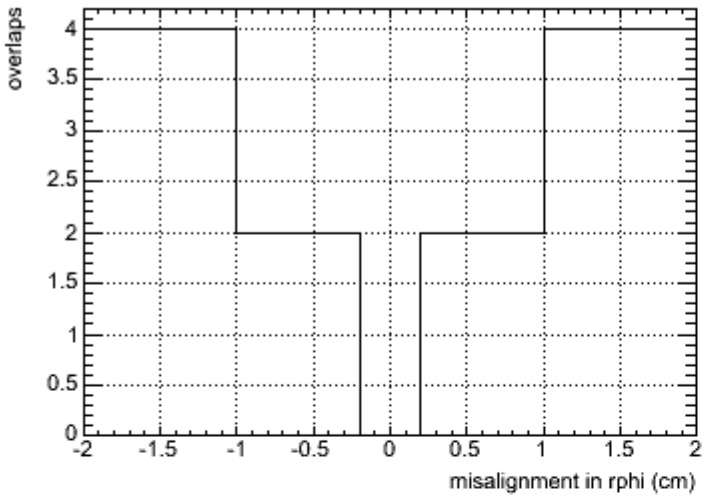


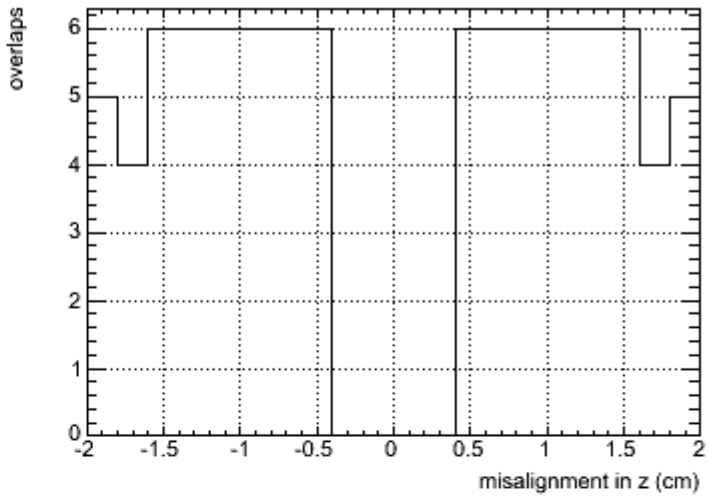


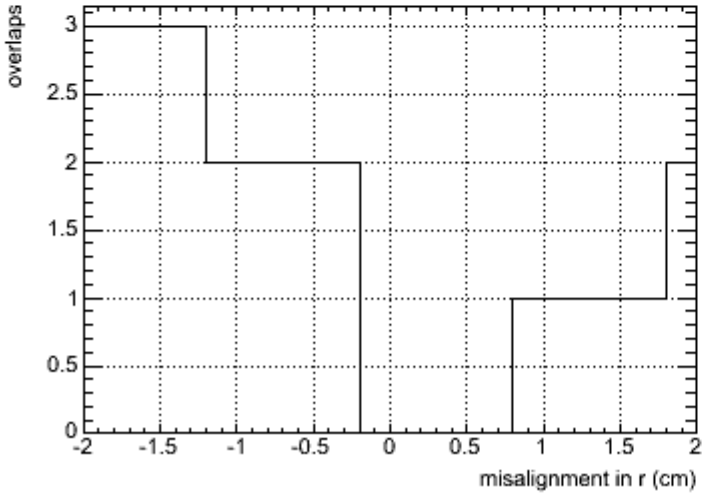


/ALIC_1/B077_1/BSEGMO0_1/BTRD0_1/UTR1_1/UTS1_1/UTI1_1/UT12_1

TRD overlaps with CB geometry from 20-Apr-2009 (with assemblies)

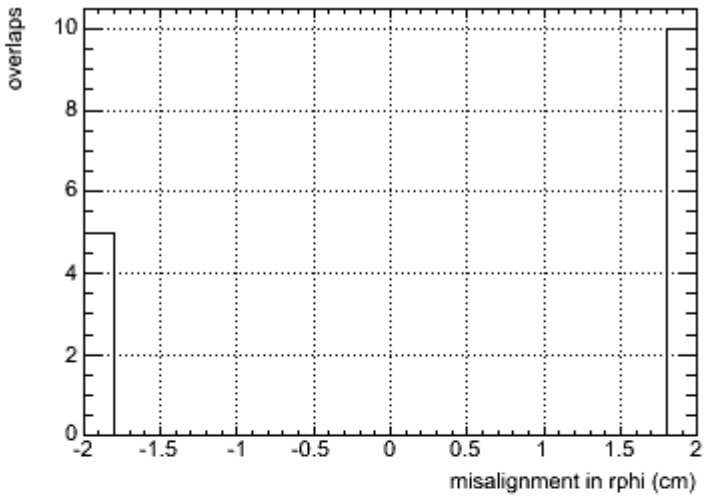


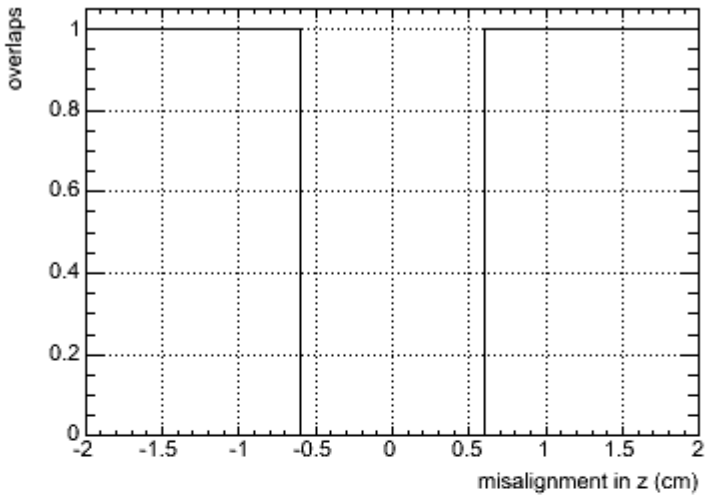


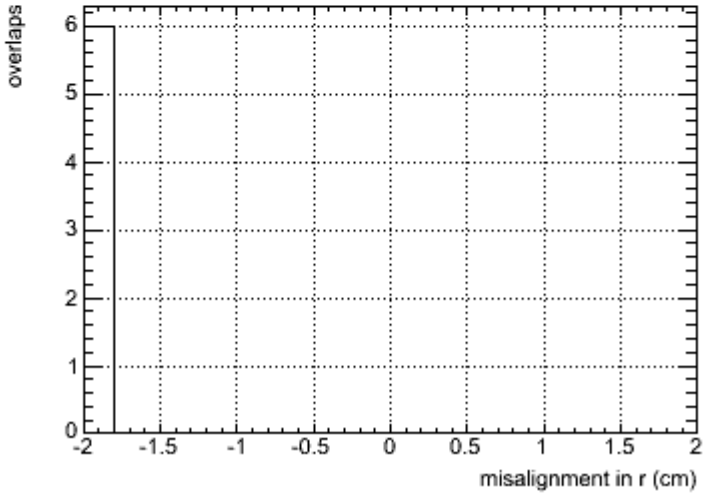


/ALIC_1/B077_1/BSEGMO0_1/BTRD0_1/UTR1_1/UTS1_1/UTI1_1/UT12_1

TRD overlaps with CB geometry from 20-Apr-2009 (with assemblies)



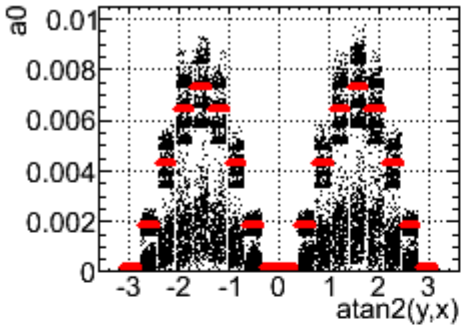


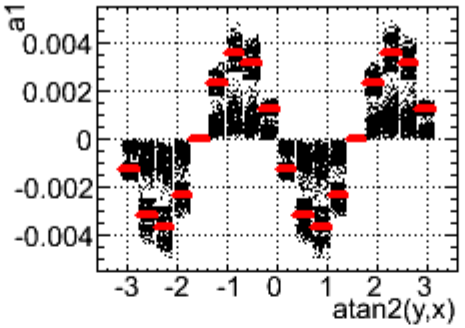


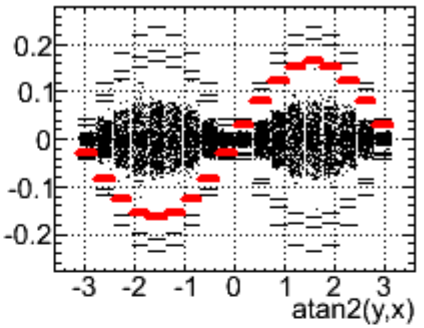
/ALIC_1/B077_1/BSEGMO0_1/BTRD0_1

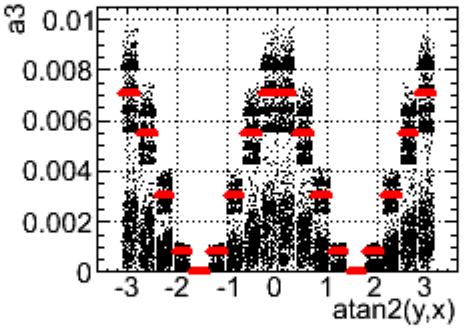
tracklet covariance for alignment

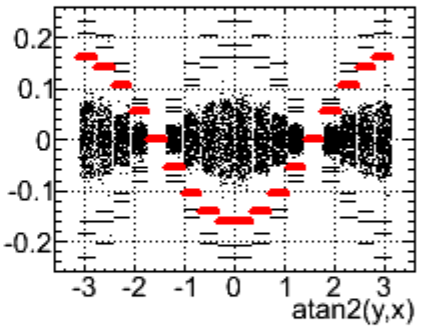
tracklet covariance

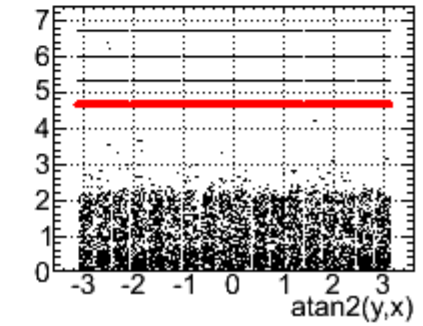






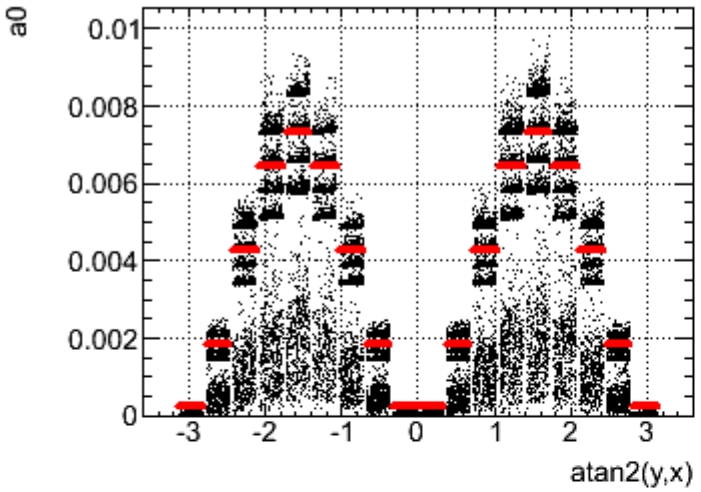


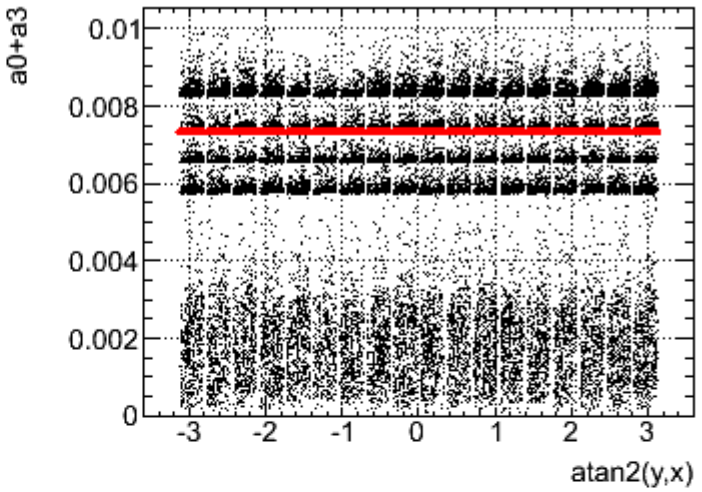


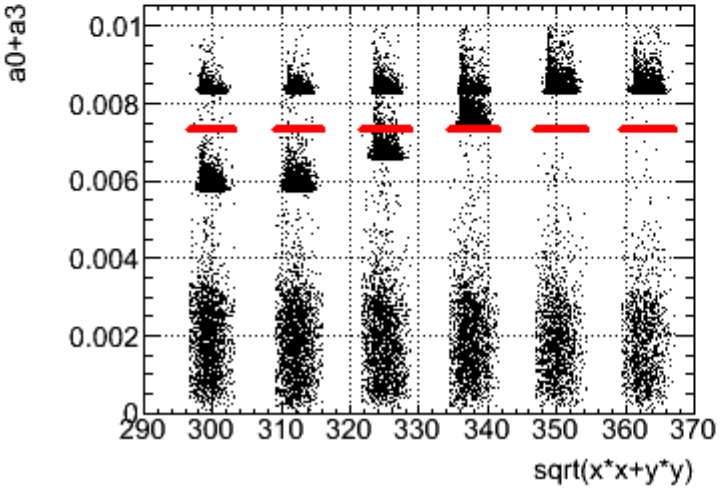


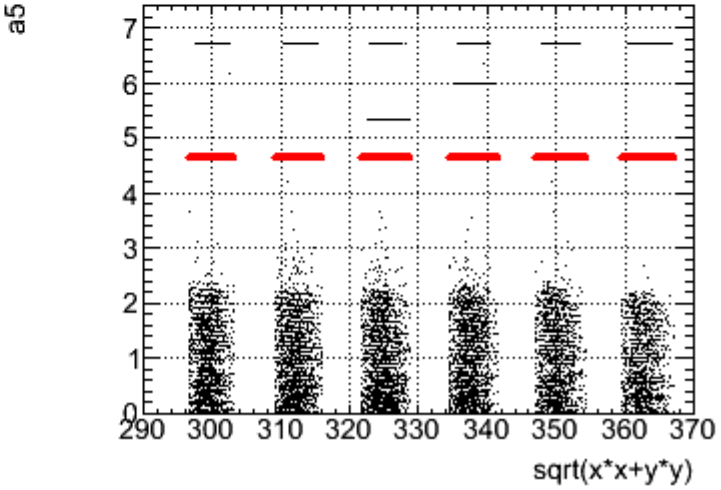
black – new tracklet-by-tracklet value provided by Alex
red – simple parametrization used till now

tracklet covariance

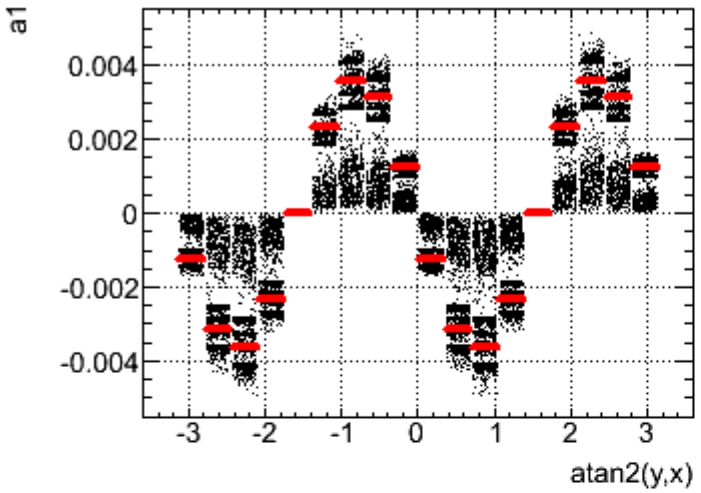


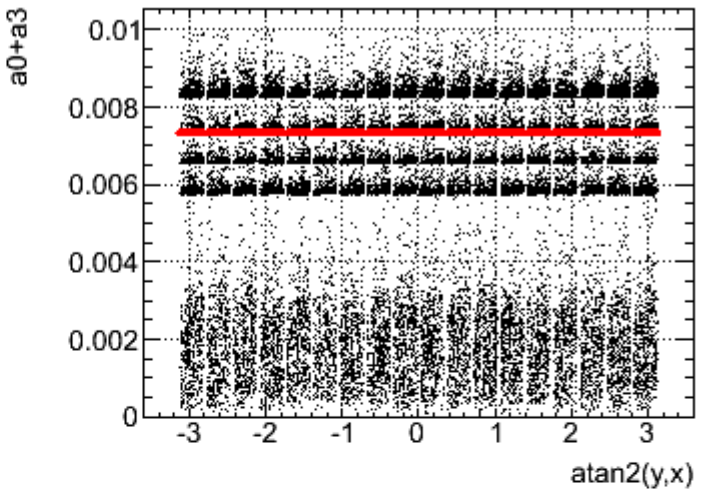


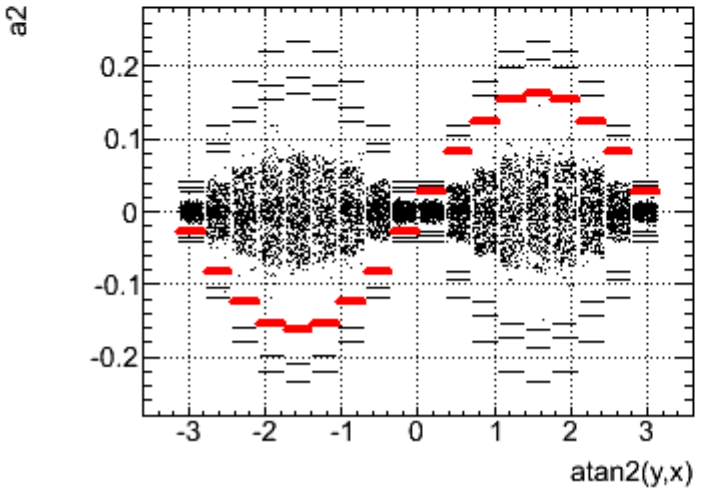


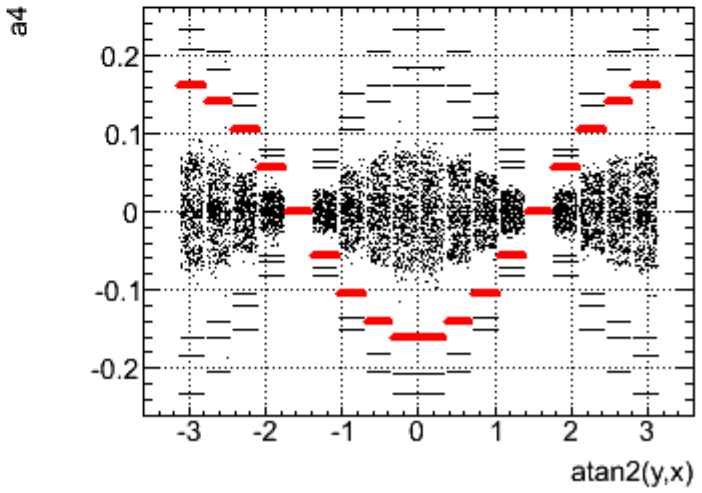


tracklet covariance









tracklet covariance

- *from now on, Alex' covariance will be used*
- *the old parametrization was quite OK, except for the sign of the tilt in half of the layers*
- *this did not lead to trouble because anyway the fitters used so far (Straight, Rieman) where fitting in two dimensions*