TRD alignment status, March 2007

- **cosmic data,** converted to AliRoot format - ongoing effort to get the standard offline reconstruction and alignment run on it

- **AliTRDalignment** - new tool for manipulating TRD alignment sets

- procedure for reading survey data now included in **AliTRDalignment** and tested using survey data from December 2006
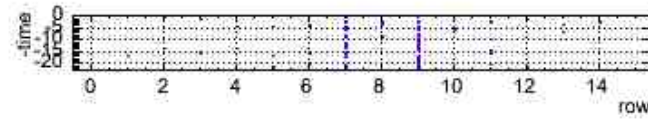
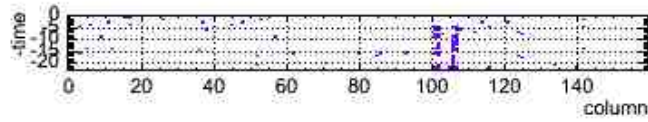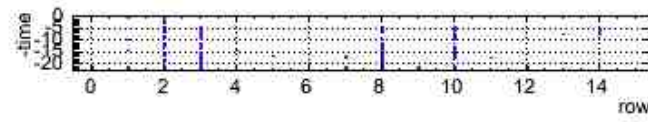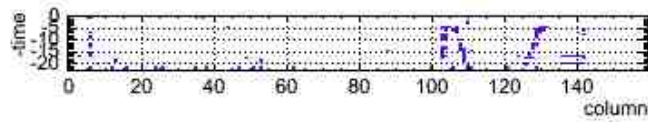# on the way to analyze cosmics in AliRoot – standalone TRD tracking (here still with simulated data)
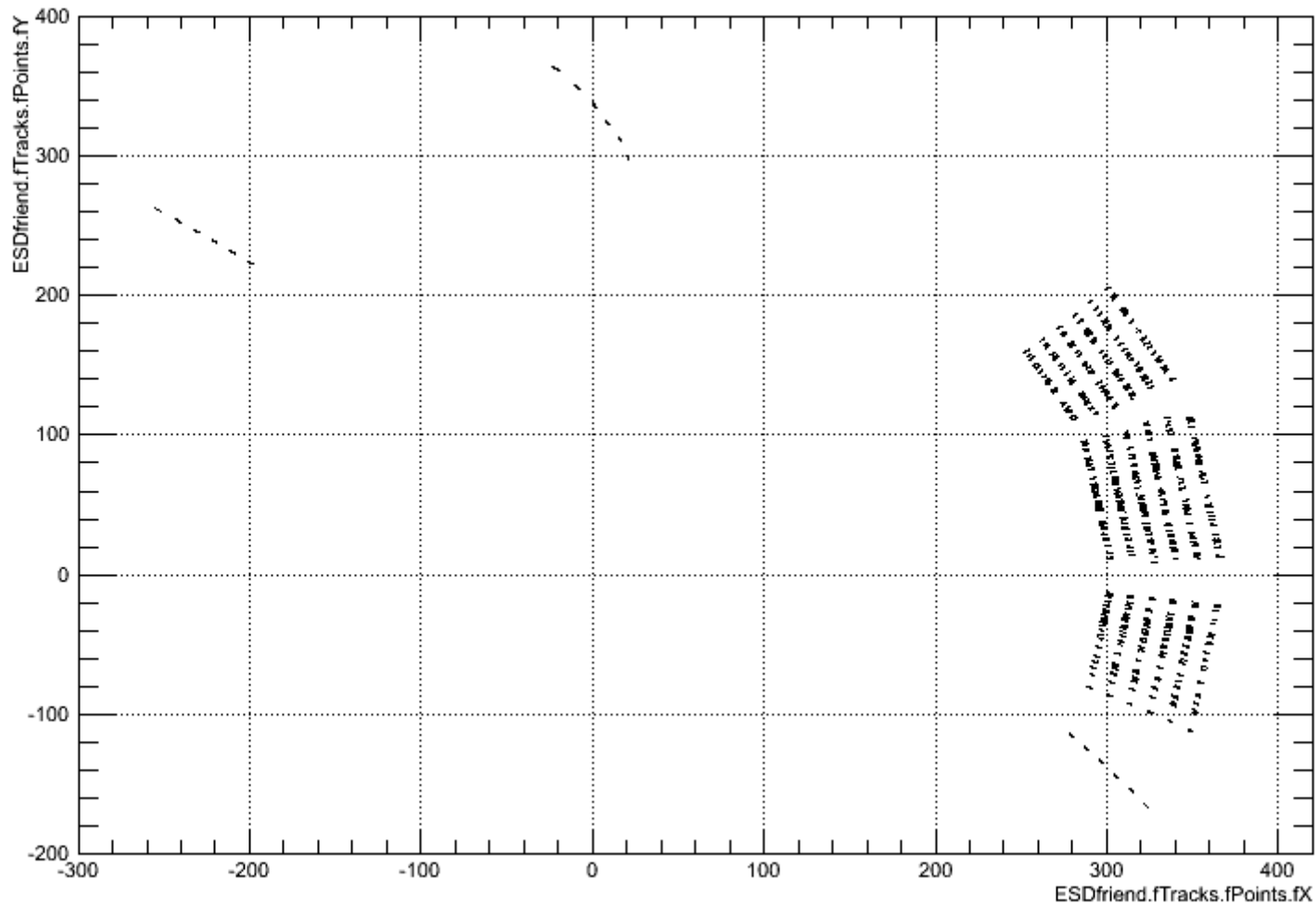
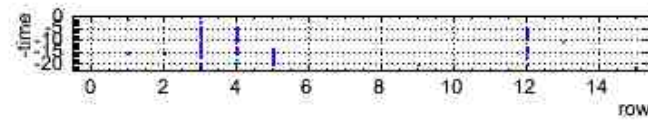# cosmic event 20061008-2302-ev0051 - digits
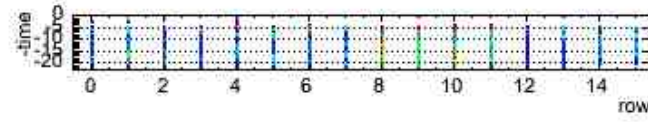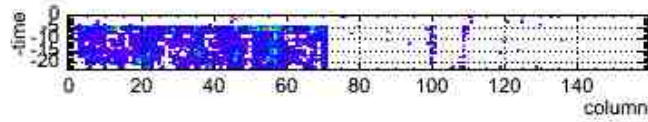
det 59

det 58

det 57
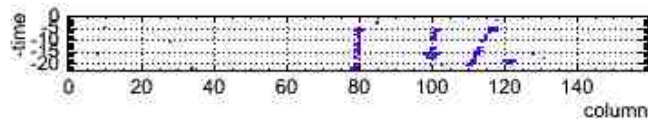
det 56
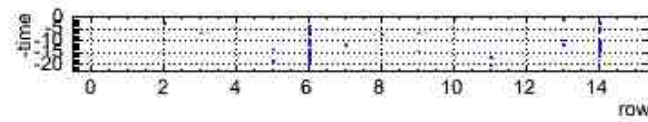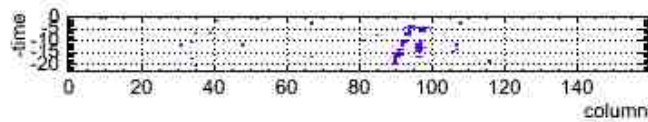
det 55
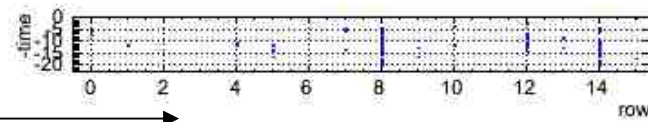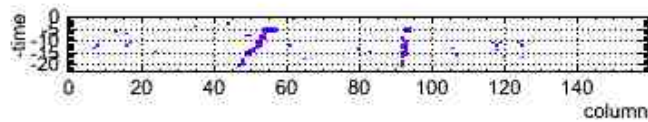
det 54
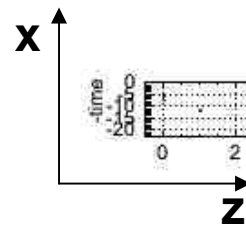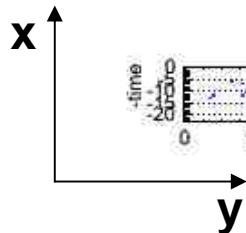
cosmic event 20061008-2302-ev0051 – rec points

cosmic event 20061008-2302-ev0051 – tracks

... no tracks found

in spite of all "roads" wide open

central barrel alignment procedure applied to TRD

PointSelector.C ⟵ **AliESDs.root AliESDfriends.root**

↓

AliTrackPoints.root

↓

AliAlignmentTracks

↙ ↘

AliAlignObj   **RiemanAlign Debug.root**
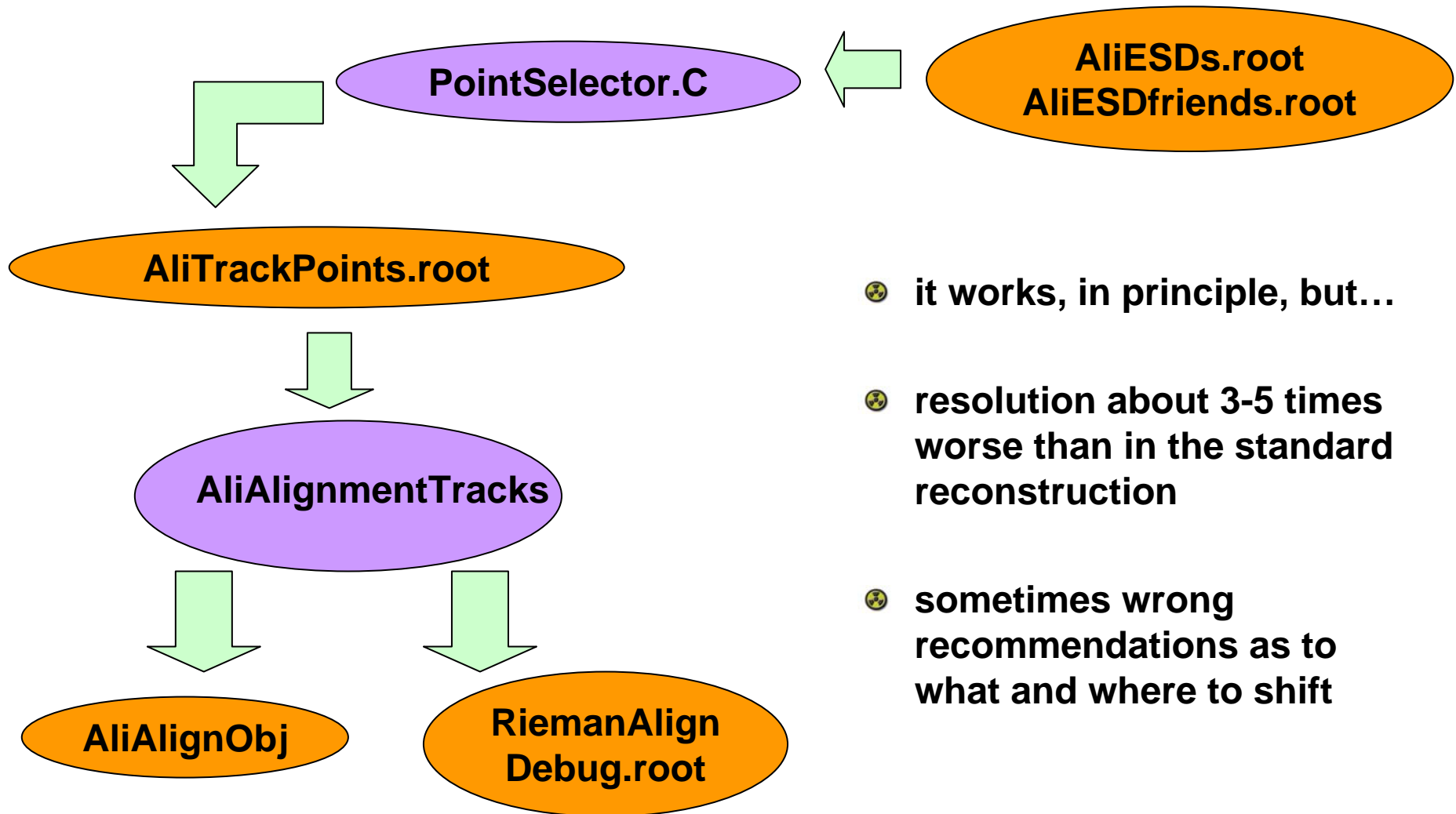
- ⚙ **it works, in principle, but…**

- ⚙ **resolution about 3-5 times worse than in the standard reconstruction**

- ⚙ **sometimes wrong recommendations as to what and where to shift**

central barrel alignment procedure applied to TRD
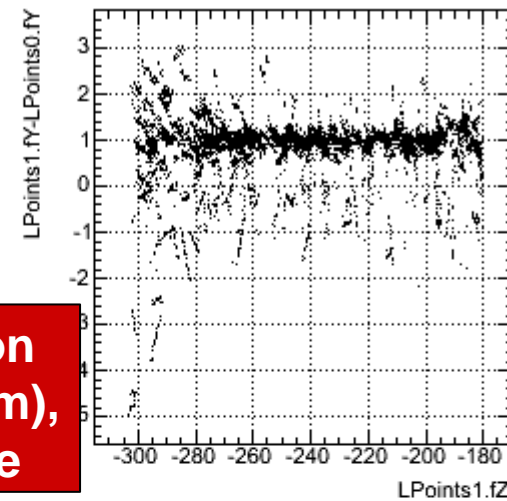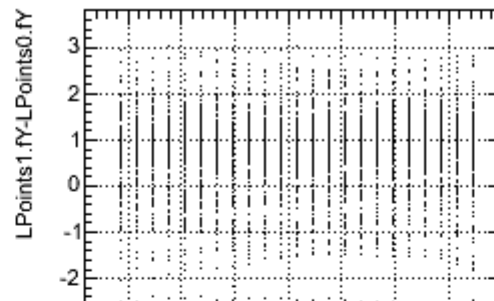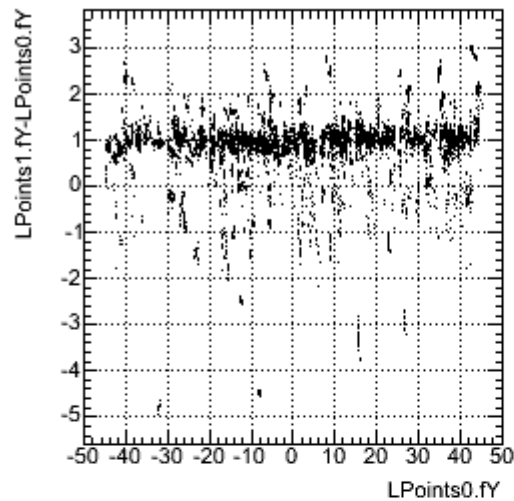
residuals: right position (sm was shifted by 1 cm), but 3-5 times too wide
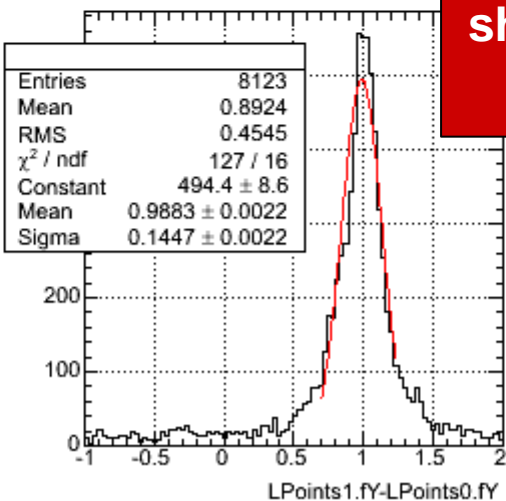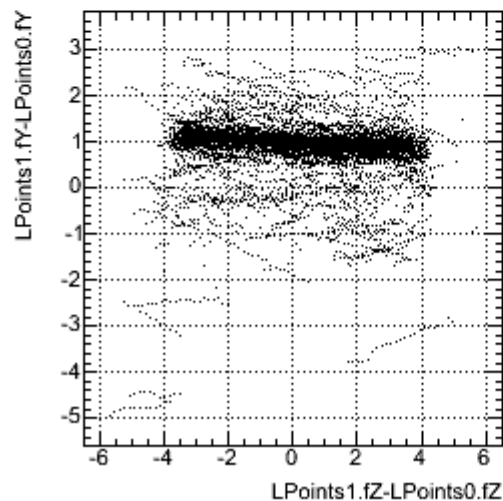
shift recommendations: entirely wrong

Entries	8123
Mean	0.8924
RMS	0.4545
χ^2 / ndf	127 / 16
Constant	494.4 ± 8.6
Mean	0.9883 ± 0.0022
Sigma	0.1447 ± 0.0022

(ndcapC/Sector1/InnerChamber)
(ndcapC/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

AliTRDalignment class - new tool to manipulate TRD alignment sets

ascii

root file

OCDB

geometry file

survey file

AliTRDalignment

ascii

root file

OCDB

geometry file
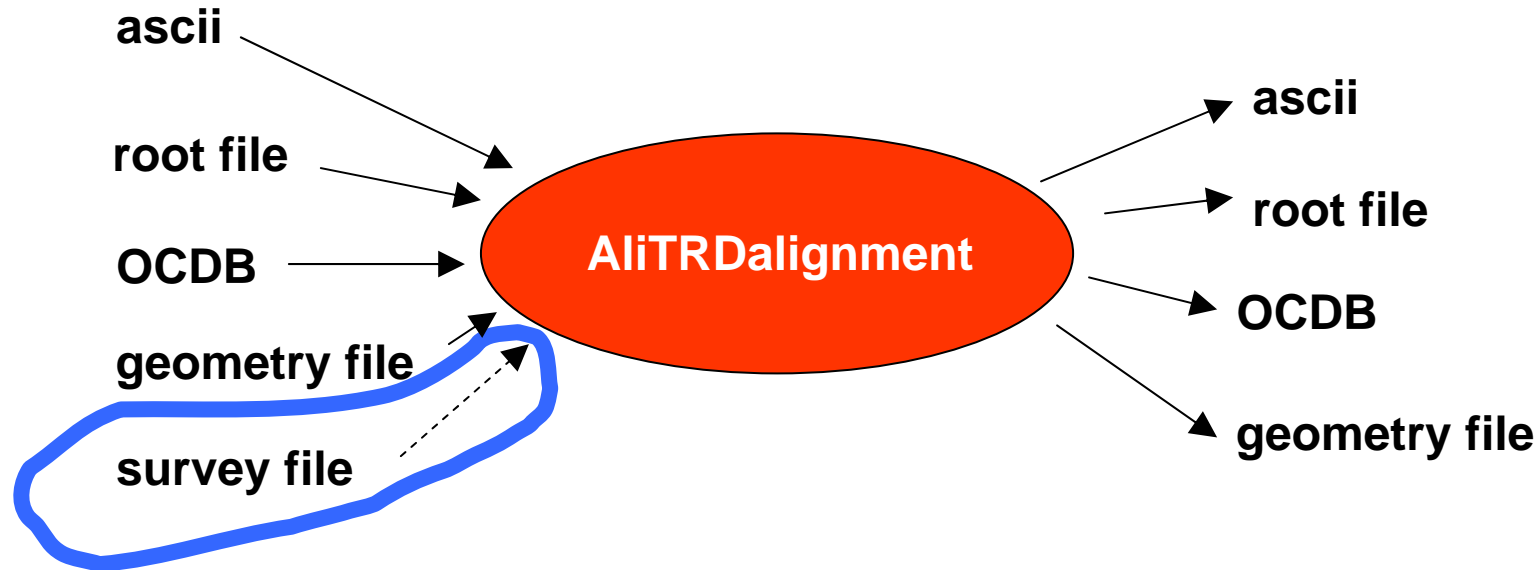
- ☢ **converting between different file formats**
- ☢ **generating random sets for simulation**
- ☢ **reporting and visualization**

processing survey data with AliTRDalignment

⚛ **What is being surveyed?**
**Four survey points at each end of
each supermodule. Unique names:**

TRD_ sm08 a/c l/h 0/1

         sm#   z   r   phi
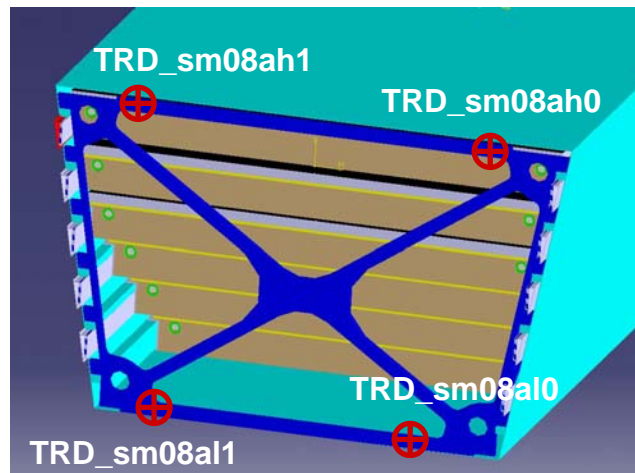
⚛ **Survey file** **- ascii file in Alice-wide standard format**

```
> Title:
ALICE - TRD Measurement of the first inserted TRD Supermodule 08
> Date:
14/12/2007
...
> Data:
TRD_sm08ah1 -3.6504 0.3337 3.5311 M 3
TRD_sm08ah0 -3.5451 0.9294 3.5306 M 3
```

processing survey data with AliTRDalignment

- **AliTRDalignment a**

  create alignment object

- **a.ReadSurveyReport("Alice_TRD_5061.txt")**

  parse survey standard ascii file, decode and
  store the survey x, y, z, error

- **a.SurveyToAlignment(8,"111000");**

  find such values of the 6 alignment parameters that,
  when applied to supermodule 8, minimize the chi-squared
  between the nominal and the measured positions of survey
  points.

processing survey data with AliTRDalignment

**comparison of Dec-2006 survey with nominal
positions of survey points in local sm frame**

```
              sm   z   r  phi      rphi          z              r
    ------------------------------------------------------------------
    local survey   8   0   1    0     -29.968      353.060       35.213
    local ideal                       -30.250      351.000       37.450
    difference                          0.282        2.060       -2.237
    local survey   8   0   1    1      30.525      353.110       35.239
    local ideal                        30.250      351.000       37.450
    difference                          0.275        2.110       -2.211
    chi2 = 208.27
```

phi: 0.3 cm off   z: 2.1 cm off   r: 2.2 cm off

processing survey data with AliTRDalignment

alignment params of supermodule 08 deduced from Dec-2006 survey

```
phi-shift   z-shift    r-shift    phi-rot     z-rot      r-rot
-------------------------------------------------------------------
  0.279      2.085     -2.224      0.000      0.000      0.000
 ±0.300    ±  0.300    ±0.300     ±0.000     ±0.000     ±0.000
                                           (only translations)


  0.295      2.085     -2.224      0.000     -0.025      0.000
 ±0.477     ±0.300     ±0.300     ±0.000     ±0.568     ±0.000
                                        (translations and z-rot)
```

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

**z: 2.1 cm
away from
muon arm**

**r: 2.2 cm
inward**

processing survey data with AliTRDalignment

shift in z – caused by the survey target offset

The coordinates given in this report are given for the center of the survey target and not for the contact surface. The following survey target has been used for the measurement of the TRD reference holes:
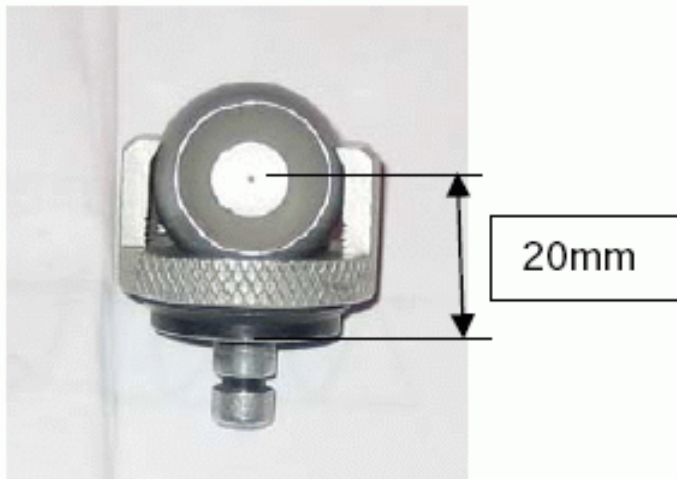
→ **nominal positions of the survey points in AliTRDalignment modified to account for the survey target offset of 20 mm**

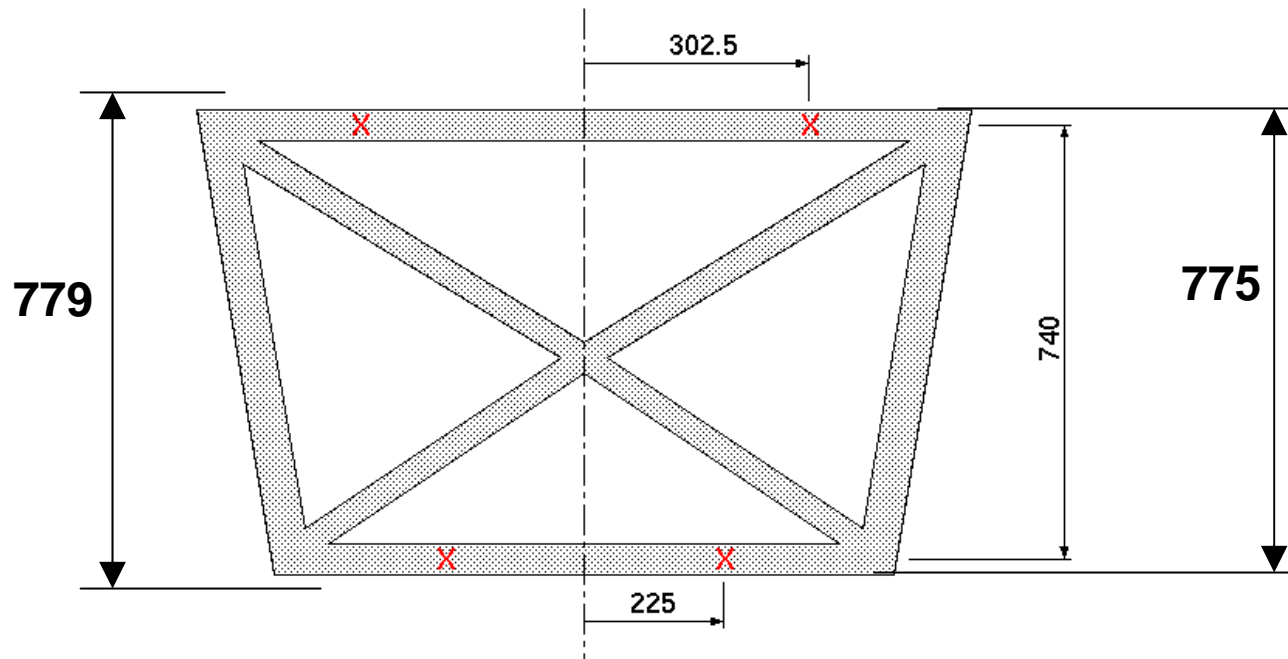# processing survey data with AliTRDalignment

"r"-coordinate of the two surveyed points:

365.25 cm   from survey

365.75 cm   from drawings (Bernd)

367.10 cm   from offline (my guess, based on
               BTRD being 779 mm thick)

**needs to be
understood**

summary

- **cosmic data** tracking needs debugging

- **survey processing** procedure implemented