Alignment and Calibration of ALICE TRD
status as of October 2005

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- **TRD from the alignment/calibration point of view**
- **summary of the parameters**
- **alignment strategy**
- **alignment exercise**

TRD Supermodule

TRD = 18 supermodules (SM)
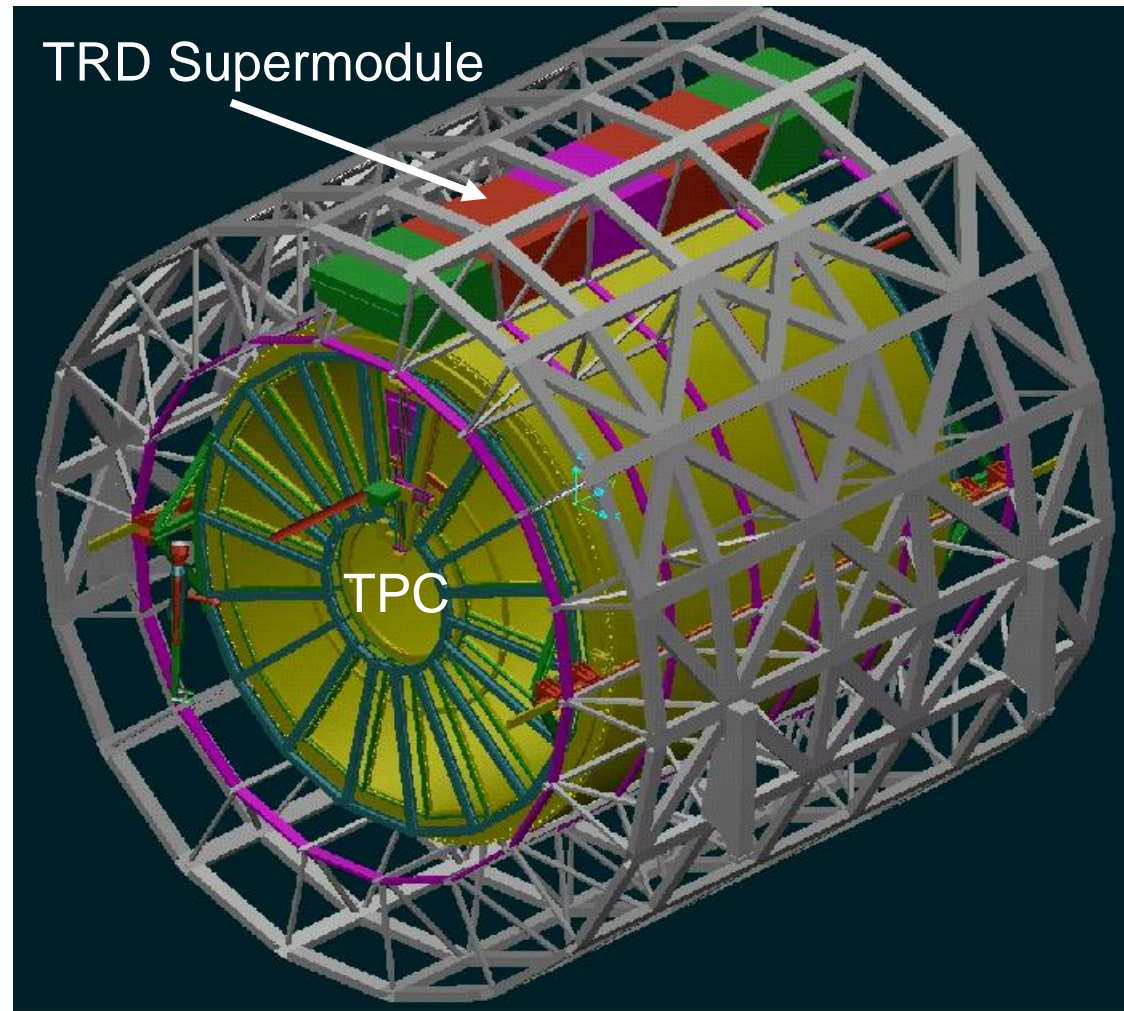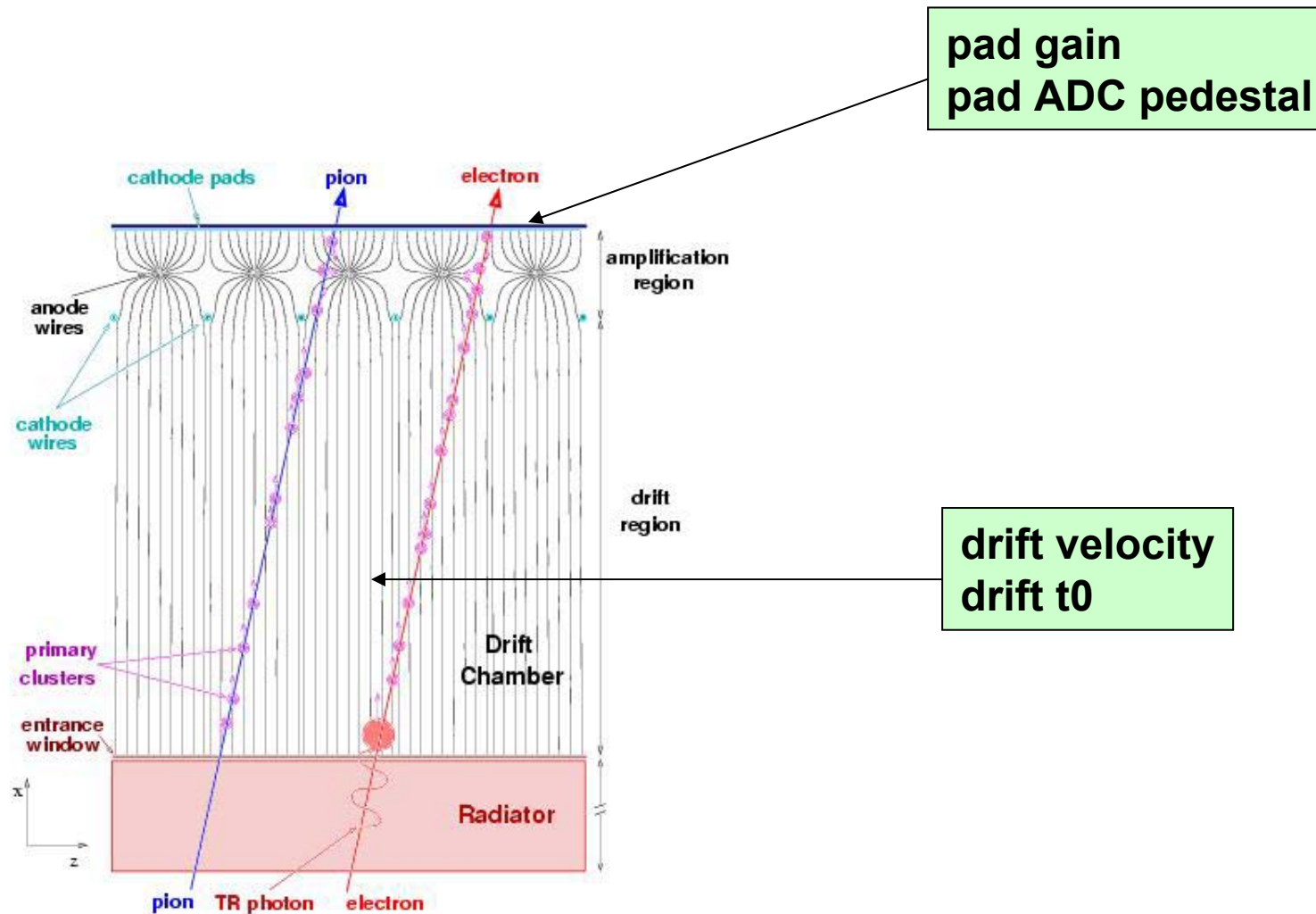
1 SM = 5 chamber stacks

1 stack = 6 chambers

total 540 chambers

TPC

Transition Radiation Detector
alignment/calibration parameters

pad gain
pad ADC pedestal

drift velocity
drift t0

TRD calibration and alignment parameters

540	chamber x,y,z	cm
540	chamber dx,dy,dz	mrad
1.2e6	pad drift velocity	relative
1.2e6	pad T0	timebin
1.2e6	pad gain	relative
1.2e6	pad ADC pedestal	ADC count

TRD calibration and alignment parameters

540	chamber x,y,z	cm
540	chamber dx,dy,dz	mrad
1.2e6	pad drift velocity	relative
1.2e6	pad T0	timebin
1.2e6	pad gain	relative
1.2e6	pad ADC pedestal	ADC count
540	chamber drift velocity	cm / timebin
540	chamber drift T0	timebin

TRD calibration and alignment parameters

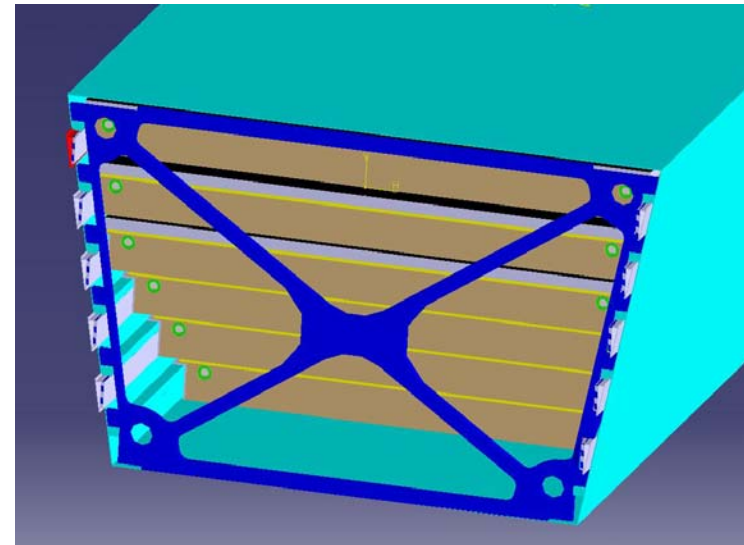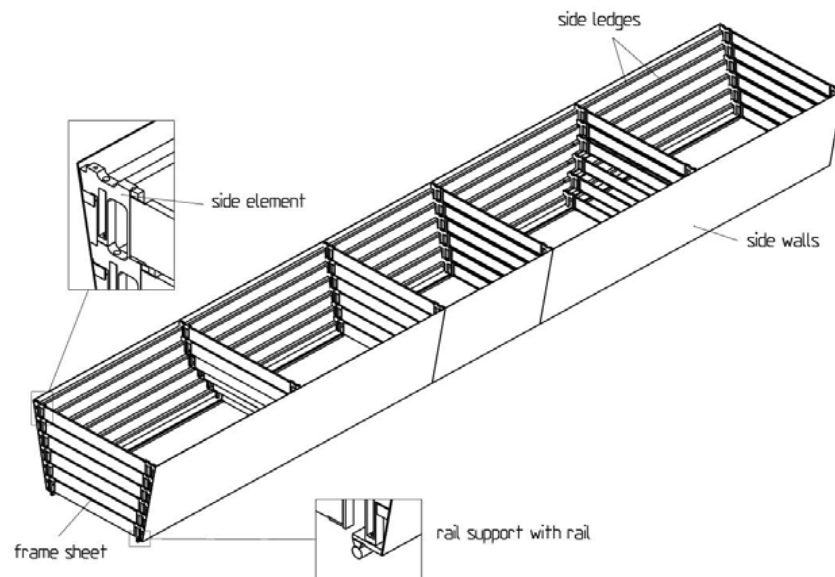|		
90	stack x,y,z	cm
90	stack dx,dy,dz	mrad
540	chamber x,y,z	cm
540	chamber dx,dy,dz	mrad
1.2e6	pad drift velocity	relative
1.2e6	pad T0	timebin
1.2e6	pad gain	relative
1.2e6	pad ADC pedestal	ADC count
540	chamber drift velocity	cm / timebin
540	chamber drift T0	timebin

TRD calibration and alignment parameters

90	stack x,y,z	cm	after each B change
90	stack dx,dy,dz	mrad	after each B change
540	chamber x,y,z	cm	month-year
540	chamber dx,dy,dz	mrad	month-year
1.2e6	pad drift velocity	relative	week-year
1.2e6	pad T0	timebin	week-year
1.2e6	pad gain	relative	day
1.2e6	pad ADC pedestal	ADC count	day
540	chamber drift velocity	cm / timebin	hour
540	chamber drift T0	timebin	hour

alignment strategy

a)   rough knowledge of geometry (nominal design values)
b)   relative alignment of the 6 chambers within a stack by cosmics
c)   relative alignment of the 6 chambers within a stack in a B=0 run
d)   alignment of the stack in respect to the TPC in a B=0 run
e)   alignment of the stack in respect to the TPC in a B>0 run

cosmics vs. B=0 calibration runs at LHC

cosmics

100-200 tracks /m^2 /s

one stack at a time

calibration B=0 runs

1000-2000 tracks /m^2 /s

all stacks simultaneously

initial hardware test

practice alignment procedure

get a rough alignment

ultimate alignment

alignment exercise (September 2005)

AliSimulation::RunSimulation

↓

TRD.Hits ← **modify**

↓

RunSDigitization

↓

TRD.SDigits

↓

RunDigitization

↓

TRD.Digits

↓

AliReconstruction.Run

↓   ↓ → **detect misalignment**

TRDdebug   **AliESDs**

next steps

- store additional variables: 6 residua of local TRD track
- store additional variables: 6 residua of global track

- misaligner (shifts hits?)
- aligner (based on residua, finds the needed shifts)
- practice misalign-align

- use the official tools and storage

summary

- we think we know our parameters
  (some of them we may leave unused, though)

- we know how to align and calibrate
  (residua need to be stored, though)

- storing in / retrieving from the database is likely
  to be the laborious part...

Transition Radiation Detector
mean pulse height profile