TRD Status

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Offline Week, June, 2009

Open Tasks

- Raw Data
  - Cleaning of legacy code in raw data (15/04/2009)

    `AliTRDRawStreamV2` has been removed
  - Verification of raw data volume (22/06/2009)

    Comparison of simulation to cosmics raw data volume

Raw Data Size - Simulation data and Comparison

Header Words Size		
GTU header	1+68	69 words
	5 stacks x 8 words	40 words
per half chamber	tracklet words	~2 words
	tracklet end marker	2 words
	HC header	2 words
	end of data marker	4 words
per MCM	mcm header	1 words
	ADC mask (for ZS)	1 words
Total number of header words	ZS	7885 words
	NZS	4237 words

Data Words Size for NZS data (per SM)	
Stack per SM	5
Layer per Stack	6
Half Chamber per Layer	2
ROB per HC	4 / 3(for stack2)
MCM per ROB	16
ADC per MCM	21
Time bin per ADC	30, 24, 15, etc
words per ADC	10, 8, 5
size per word	4 byte (=32 bit)
total number of words	766080 words

- **Header size per event (with 4 SMs)**
  - for ZS data = 7885 words x 4 SMs x 4 byte ~ 126 KB
  - for NZS data = 4237 words x 4 SMs x 4 byte ~ 68 KB

mismatch due to missing HC during the data taking

- **Simulation Data size per event (with 4 SMs) - NZS**
  - NZS data with 30 time bins = 4 SMs x 766080 words x 4 byte + header ~ 12 MB
  - NZS data with 15 time bins = 4 SMs x 383040 words x 4 byte + header ~ 6 MB

Real Data
→ Run 55390 ~ 10.5 MB / evt
→ Run 47995 ~ 5.3 MB / evt

- **Simulation Data size per event (with 4 SMs) - ZS**
  - header size is dominant
  - assuming 1 track is passed, averaged cluster size = 3 and 30 time bins → 18 ADCs x 2 SMs (trigger condition)
  - header + 18 ADCs x 2 SMs x 10 words per ADC x 4 byte ~ 127 KB

→ Run 53051 ~ 115 KB / evt

Open Tasks

- Quality Assurance
  - Implementation of run type (25/05/2009)
  - Implementation of simulation in QA checker (15/07/2009)
  - Implementation of reconstruction in QA checker (16/06/2009)
  - Implementation of reference data (15/07/2009)

- Simulation
  - Verification of the embedding procedures (30/06/2009)
    Missing step: ADC $\rightarrow$ digits $\rightarrow$ s-digits
    Treatment of noise (do not add simulated noise in the case of embedding into real data)

Open Tasks

- Geometry
  - Finalization of detector geometry for services and supports (27/05/2009)
  - Verification of weight of individual readout chambers and services and total weight of modules (27/05/2009)
  - Implementation of full/survey misalignment without overlaps (15/07/2009)
- Trigger
  - Implementation of the code for trigger parameters for the simulation of the trigger input to the CTP (27/05/2009)

Questions from Offline Group

- Alignment offline procedures
  - If you did not mention this during the review, do you foresee any offline procedure especially as far as alignment is concerned?
  - Does your procedure comply with the framework?

- Aligment is part of the framework as discussed in the review
  - ESDfriends: 1% high-pt tracks of approx. one day of running p+p (Pb+Pb)

Questions from Offline Group

- HLT matters
  - Are you planning to use HLT and if so for what purpose? Reconstruction? Calibration? QA output?
    Yes, essentially for all of them
  - As a basis for physics trigger studies?
    Yes: di-leptons, jets, e-ID, ...
  - For something else?
    Monitoring, event display
  - If you are not intending to use HLT, can you say why?

- What are your detectors special plans for first data?
  - Krypton calibration

Questions from Offline Group

- Important problems reported in Savannah
  - Is your detector concerned by any important Savannah report?
  - If yes, does this affect the quality of the physics results?
  - What are the current actions to solve these problems?

- “TPC z-shift”, currently being investigated (Marian)
- “TRD tracks not propagated to the outer wall of TPC”, could probably be closed (Alexandru)

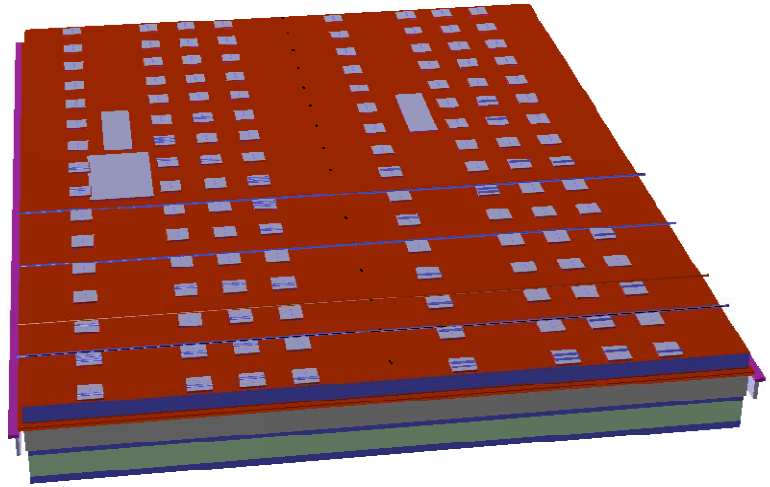
Questions from Offline Group

- Performance issues
  - Is your detector affecting the overall CPU and memory (resident and virtual) consumption in the simulation (including the expert QA mode)?
  - Is your detector affecting the overall CPU and memory (resident and virtual) consumption in the reconstruction (including the expert QA mode)?
  - If yes, what are the current actions to solve these problems?

- Several improvements have been introduced in the last year
  - Restructured digitization
  - Removal of memory leaks, etc.
  - Unless there are serious complaints, no further action is foreseen right now (of course, suggestions are always welcome)

Geometry Revision

- Changes:
  - Chamber volume (UTxx) now defined via `TGeoAssembly`
  - Revision of material layers
  - Revision of support rails
  - Many small details

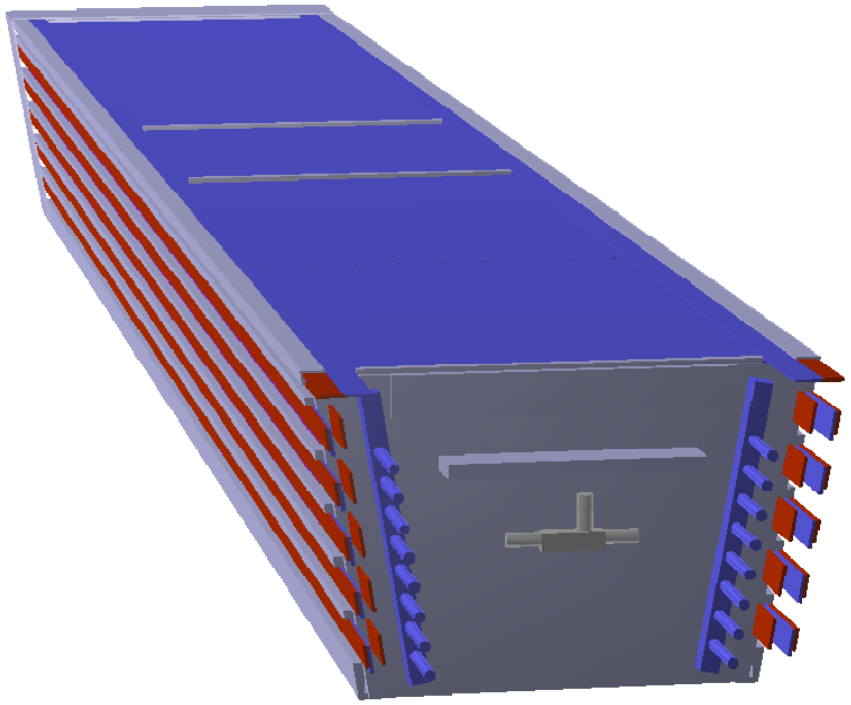


- ROC weight
  - Large fluctuations in reality, since amount of add. glue to fix leaks can be quite different (~ 0.4 – 1.0kg)
  - Additional layer in material budget (right now: 0.6kg)

Volume	Reality	Aliroot
L2C1 chamber (inc. electronics +cooling)	25.5–25.8kg	25.3kg
Radiator (L0C1)	4.05kg	3.97kg
Backpanel (L0C1)	7.6kg	7.56kg

Geometry Revision

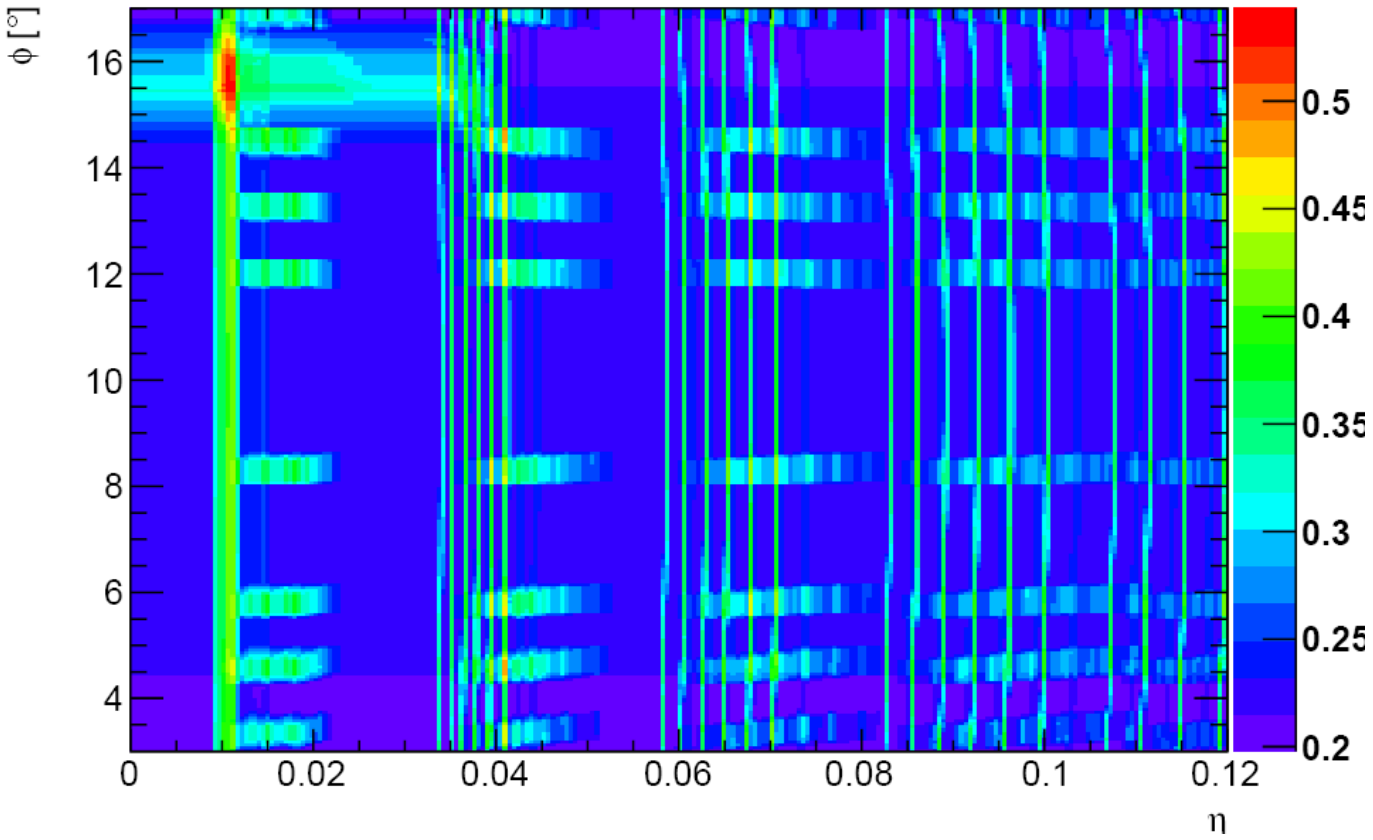
- Total weight SM00 in Aliroot: 1607kg



Material Budget

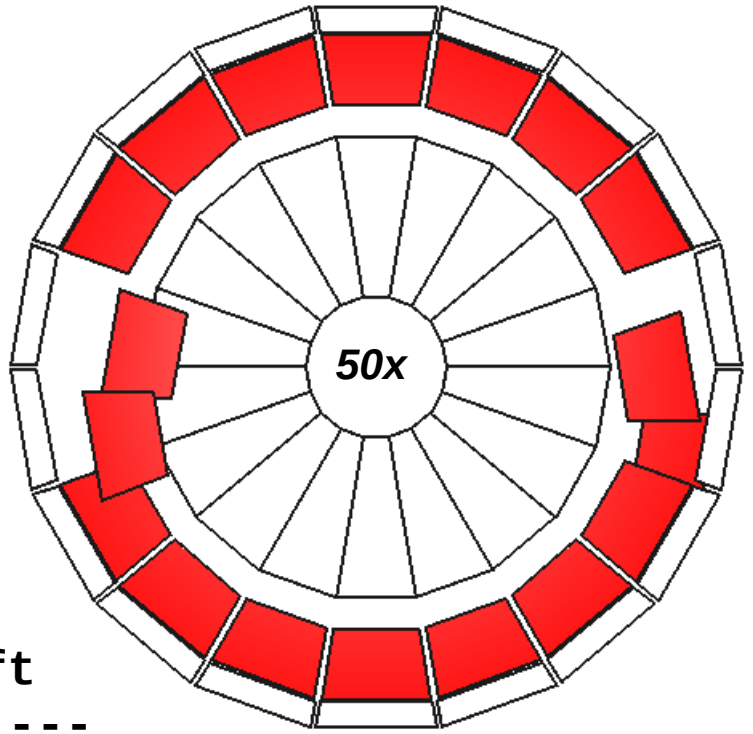
Name	Mother	Material	Description	Thickness [cm]	Density [g/cm^3]	X/X_0 [%]
URMYxx	UAxx	Mylar	Mylar layer on radiator (x2)	0.0015	1.39	0.005
URCBxx	UAxx	Carbon	Carbon fiber mats (x2)	0.0055	1.75	0.023
URGLxx	UAxx	Araldite	Glue on the fiber mats (x2)	0.0065	1.12	0.018
URRHxx	UAxx	Rohacell	Sandwich structure (x2)	0.8	0.075	0.149
URFBxx	UAxx	PP	Fiber mats inside radiator	3.186	0.068	0.490
UJxx	UAxx	Xe/CO_2	The drift region	3.0	0.00495	0.167
UKxx	UDxx	Xe/CO_2	The amplification region	0.7	0.00495	0.039
UWxx	UKxx	Copper	Wire planes (x2)	0.00011	8.96	0.008
UPPDxx	UFxx	Copper	Copper of pad plane	0.0025	8.96	0.174
UPPPxx	UFxx	G10	PCB of pad plane	0.0356	2.0	0.239
UPGLxx	UFxx	Araldite	Glue on pad plane	0.0923	1.12	0.249
		Araldite	+ additional glue (leaks)	0.0505	1.12	0.107
UPCBxx	UFxx	Carbon	Carbon fiber mats (x2)	0.019	1.75	0.078
UPHCxx	UFxx	Aramide	Honeycomb structure	2.0299	0.032	0.169
UPPCxx	UFxx	G10	PCB of readout boards	0.0486	2.0	0.326
UPRDxx	UFxx	Copper	Copper of readout boards	0.0057	8.96	0.404
UPELxx	UFxx	Copper	Electronics and cables	0.0029	8.96	0.202

Radiation Length Map



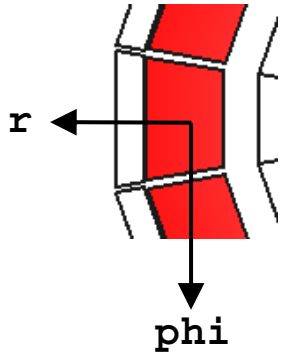
- SM#0: $\langle X/X_0 \rangle$ = 24.88% (3.0 < ϕ < 17.0, 0.0 < η < 0.12)

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



Dariusz

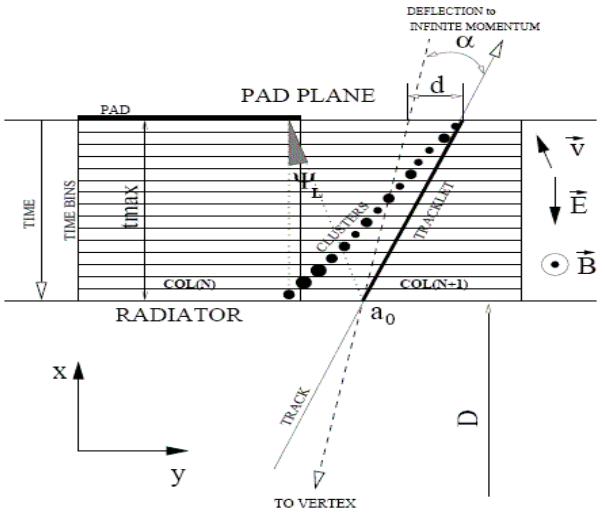
Survey December 2006

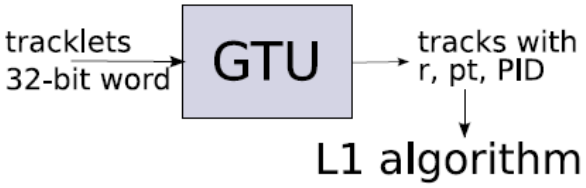
Only A-side measured
Only shifts allowed
Shifts in cm, tilts in degrees

SM	phi-shift	z-shift	r-shift	z-tilt
08	0.279	0.085	-1.554	

TRD L1 Trigger Simulation

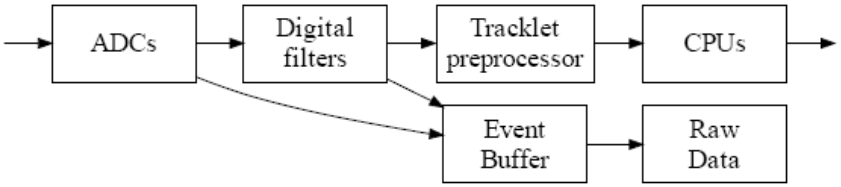
- TRD L1 Trigger consists of two components
- Local tracklet finder
  - Finds short tracklets inside single chamber
  - Implementes in Tracklet Processor (TRAP) chip
- Global Tracking Unit (GTU)
  - Connects tracklets from several layer to global track
  - Assigns p_t and e-PID
  - L1 trigger decision (High-p_t electrons, Υ, jets)

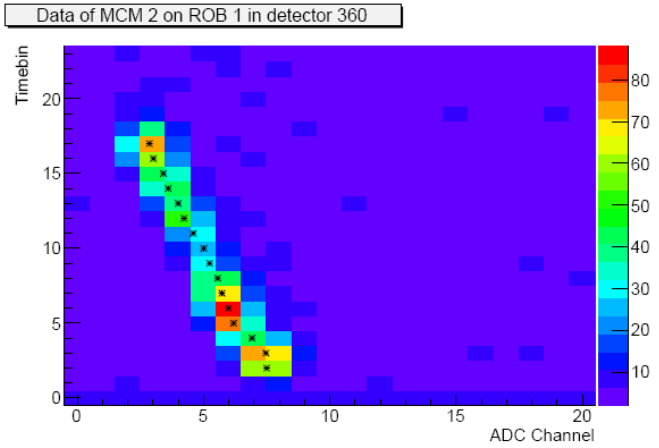




Tracklet Processor (TRAP) Simulation

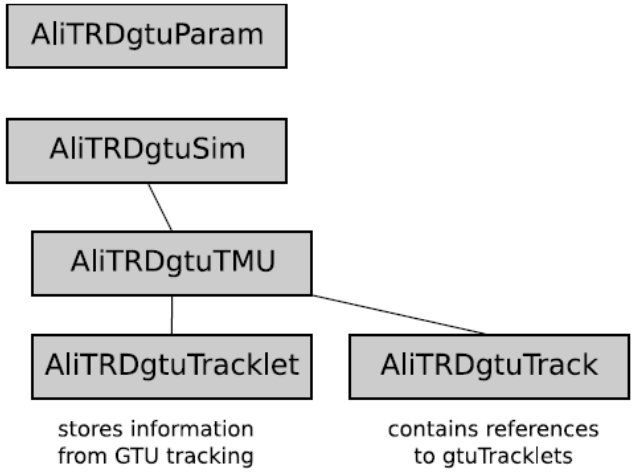
- `AliTRDmcmSim`
  - Simulation of online (hardware) algorithm `AliTRDtrapAlu`
  - `AliTRDmcmTracklets`
    1. Hit detection (3 pads)
    2. Filling fit registers (fit sums)
    3. Calculation of linear fit
  - Revised version in SVN (J. Klein)
  - `AliTRAPConfig`
- Other functionalities:
  - Zero suppression
  - Digital filters (pedestal, gain, tails)





Global Tracking Unit (GTU) Simulation

- Simulation of GTU
  - Simulates L1 tracking algorithm as done online by FEE
  - Needed for offline test of trigger algorithms and efficiency evaluation
  - Input: simulated LTU tracklets



- Implementation
  - `AliTRDgtuSim` (J. Klein)

- Output
  - `AliTRDgtuTracklet`
  - General tracklet base class: `AliTRDtracklet`