Raw Data Session: TOF Report
(from Hardware to Software)

ALICE TOF group
S.Arcelli for A. De Caro

Alice Offline week, 3 Oct 2006

Schedule of TOF Detector Installation/Commissioning

- Two assembled Supermodules ready and tested - being installed in ALICE in these days (within 15 Oct). After installation, plan to continue testing them with cosmic data

- 2nd TOF installation window from 2-29 May 2007. Plan to have ≥50% of the TOF installed for the LHC start-up in November 2007. Install the remaining SMs during the 2007/08 shutdown

- TOF DAQ: P. Antonioli
- TOF DQM via MOOD: R. Preghenella
- Data Analysis: S. Arcelli, A. De Caro, C. Zampolli

TOF Raw Data

- Raw Data format finalized early this year (TOF Technical Note in preparation, by P.Antonioli) and implemented in aliroot the last summer:
  - AliTOFDDLRawData, AliTOFRawStream: define the Data Structure, provide method to read Raw Data and the mapping between TOF Hardware/Software numbering

- Generation of Raw Data: AliTOF::Digits2Raw (DDL, ROOT and DATE files)

- Reconstruction from Raw Data working ok, but we still have a gAlice dependence in tracking (will be removed within this week)
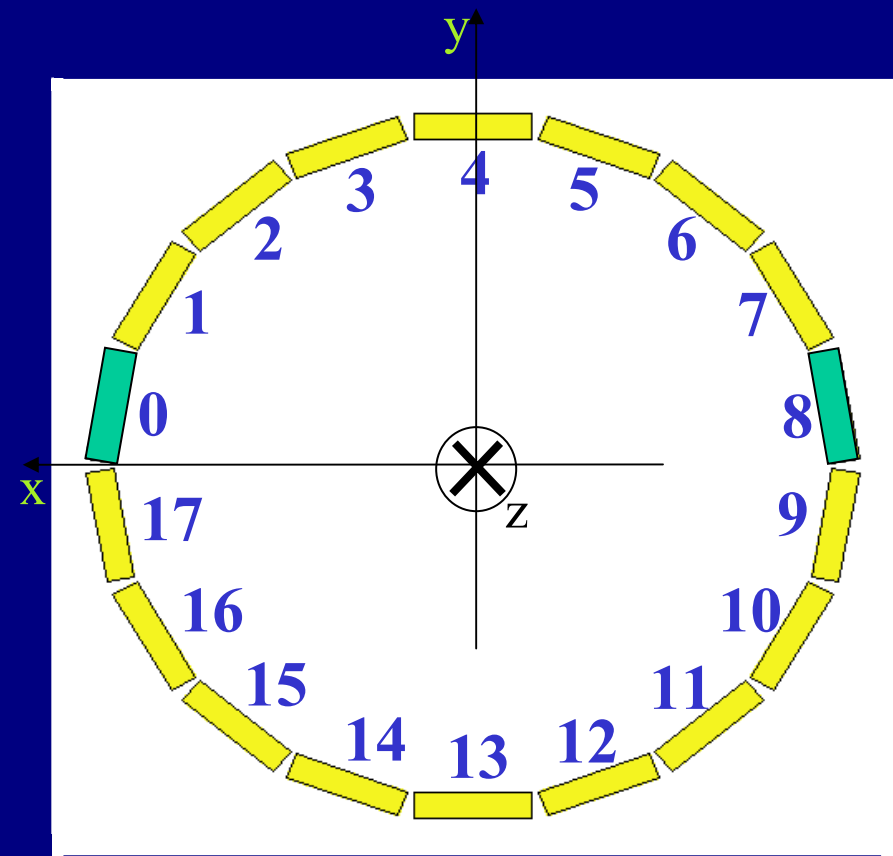
Software Numbering

TOF Sector index

Side A (RB24)
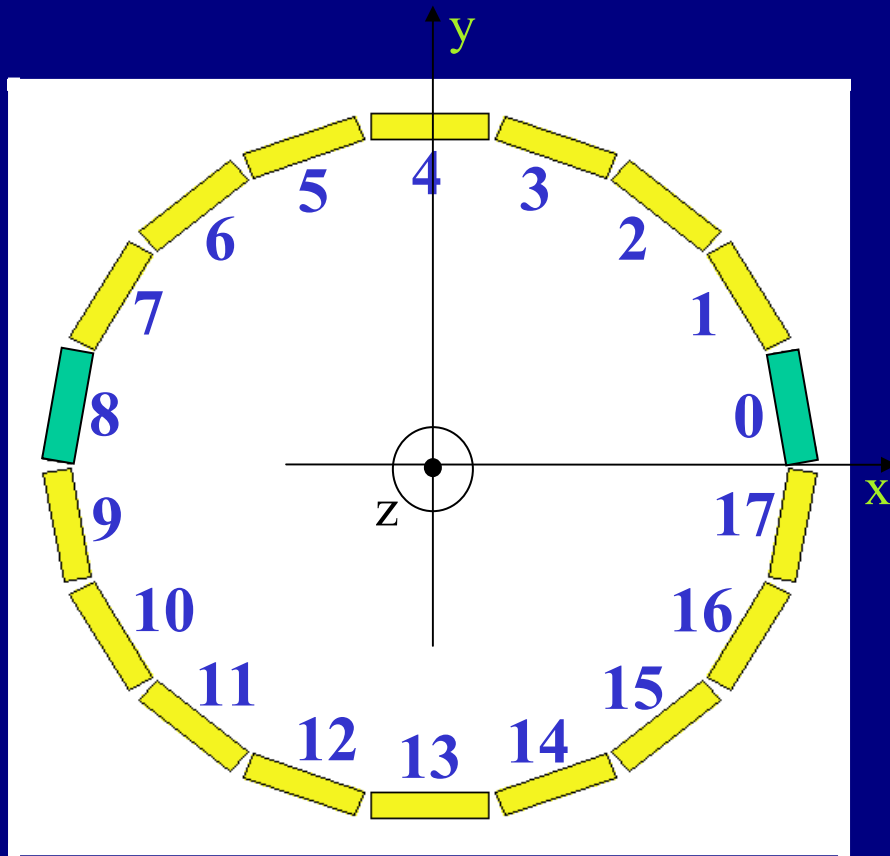
Side C (RB26)

TOF Plate index
(Software Numbering)

BABY Frame (Side A)

first TOF supermodule (SM8)
07 July 2006

0
1
2
3
4

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BACK Frame (Side C)

TOF Channel index within a Strip
(Software Numbering)

BACK Frame (Side C)

1
0

| 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

$\rho\varphi$

| 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

BABY Frame (Side A)

Z

TOF DDL/EquipmentID mapping & Geometrical Mapping inside a DDL

- Four crates per each TOF supermodule, 2 on the side A and 2 on side C   (4x18=72 $\leftrightarrow$ 72 TOF DDLs)

- Each TOF crate contains 12 slots, hosting:
  - the Data Readout Module (DRM), which acts as a VME master and is the main interface to the ALICE DAQ system;
  - the Local Trigger Module (LTM);
  - the Clock Pulser Distribution Module (CPDM), right crates only;
  - 9/10 TDC Readout Modules (TRMs) in the right (left) crates

Data from TRMs and LTM are encapsulated in the DRM data. Structure of a TOF event fragment:
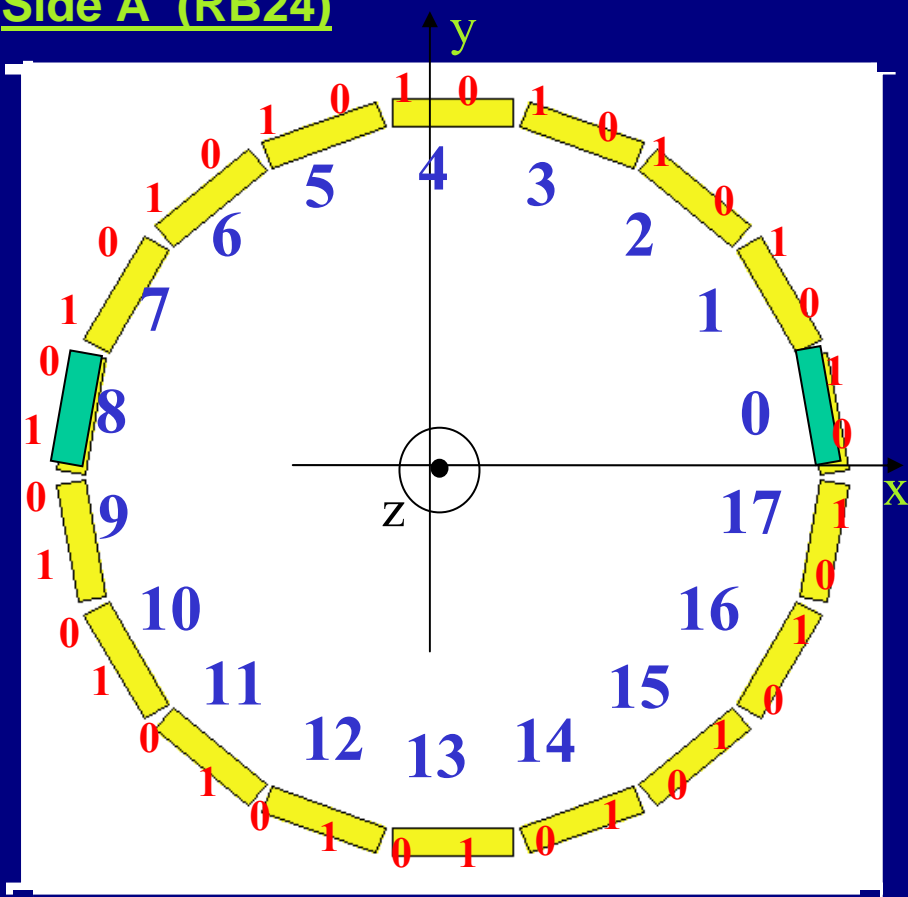
Common Data Header (CDH) (8 words)
DRM header
DRM data (4 words)
  TRM header from slot #X
        TRM hits (variable n. of words)
  TRM trailer from slot #X
  TRM header from slot #Y
        TRM hits (variable n. of words)
  TRM trailer from slot #Y
  LTM header from slot #2
        LTM data (33 words)
  LTM trailer from slot #2
DRM trailer

TRM global header
  TRM header from chain 0
    TDC hits from channels
  TRM trailer from chain 0
  TRM header from chain 1
    TDC hits from channels
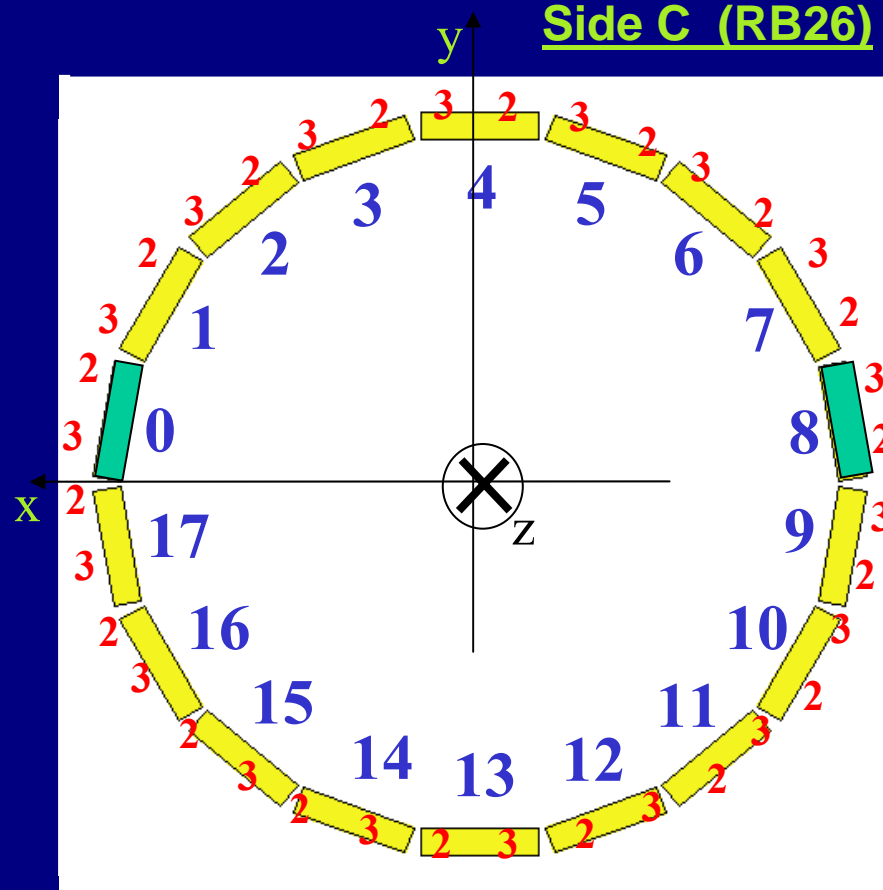 TRM trailer from chain 1
TRM global trailer

TOF DDL/EquipmentID mapping

TOF DRM (hardware numbering): SM [0-17] and Crate [0-3] indexes

Side A (RB24)

Side C (RB26)

TOF DRM ID:

6	5	4	3	2	1	0
Supermodule ID					Crate ID	

0,…,71 ⟶ **DRM-ID = 4 x Supermodule ID + Crate ID**

Side A (RB24)
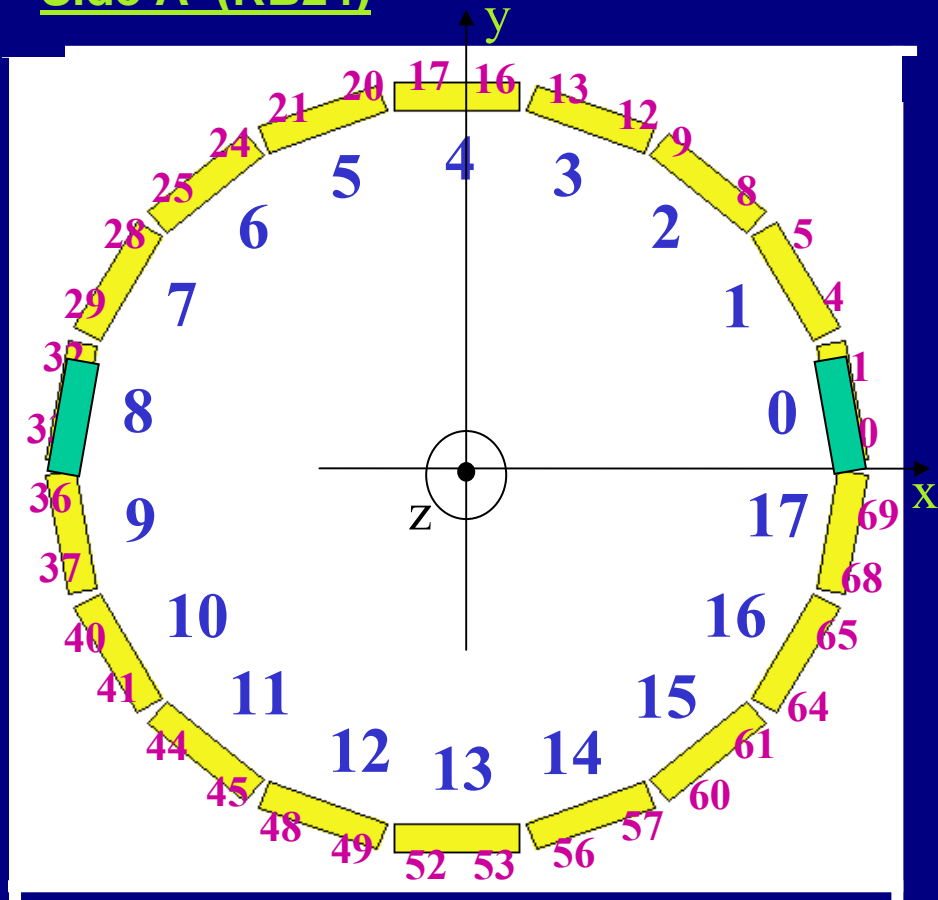
Side C (RB26)
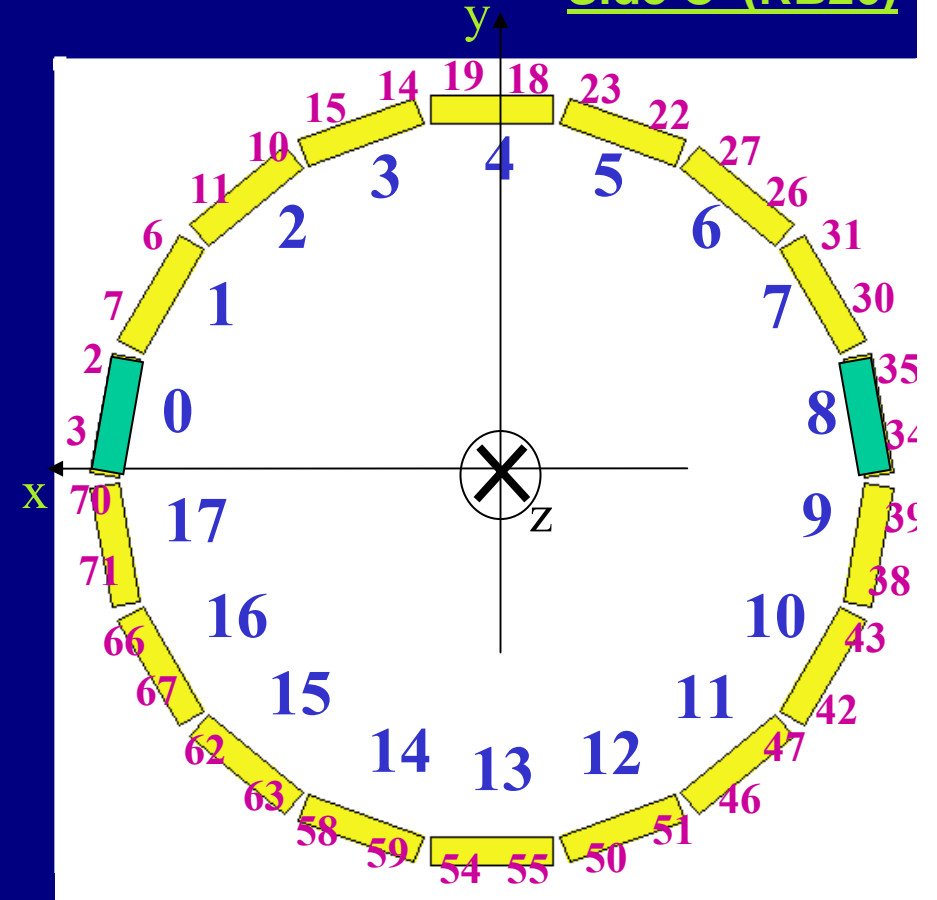
DRM-ID number ↔ TOF DDL index ,
(+ TOF Det ID <<8) → TOF Eq. ID

Geometrical Mapping inside a DDL

TOF TRM: TRM index
[3-12] (left crate), [4-12] (right crate)

TOF TRM: TRM chain index [0-1]

TRM chain 1

PULSE 2 PULSE 1 PULSE 0
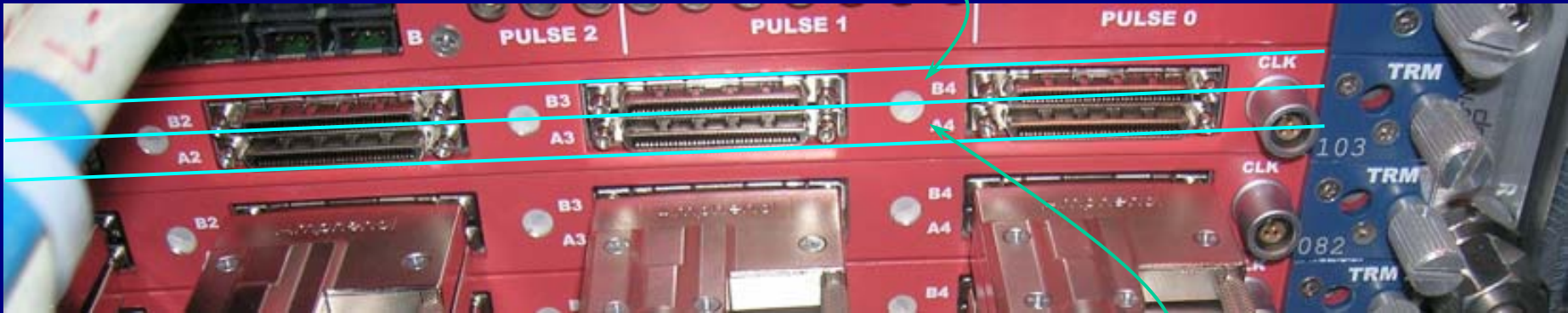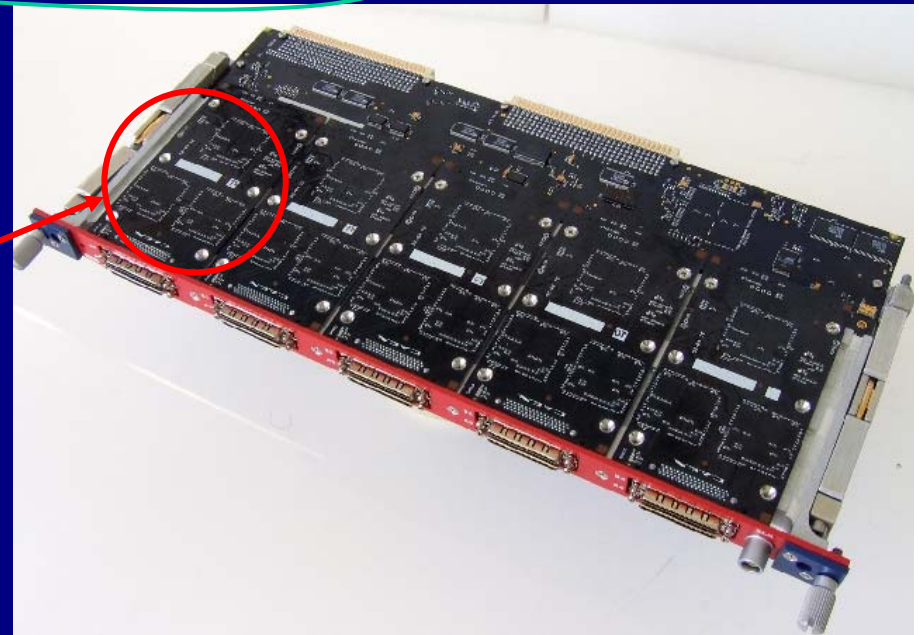
TRM chain 0

5 "Piggy Backs" /TRM chain, each with 3 HPTDC chips for one Front End card read-out →15 TDCs/chain, IDs [0-14]

Front-End cards (FEA)

FEA cards

2 1 0   2 1 0   0 1 2   0 1 2

Vhno' ASIC
erface card

TOF TRM chain 0:
TDC IDs: 0,1,2

p

Signal

1
0

Left Crate   Right Crate

TOF TRM, inside a TDC: channel ID [0-7]

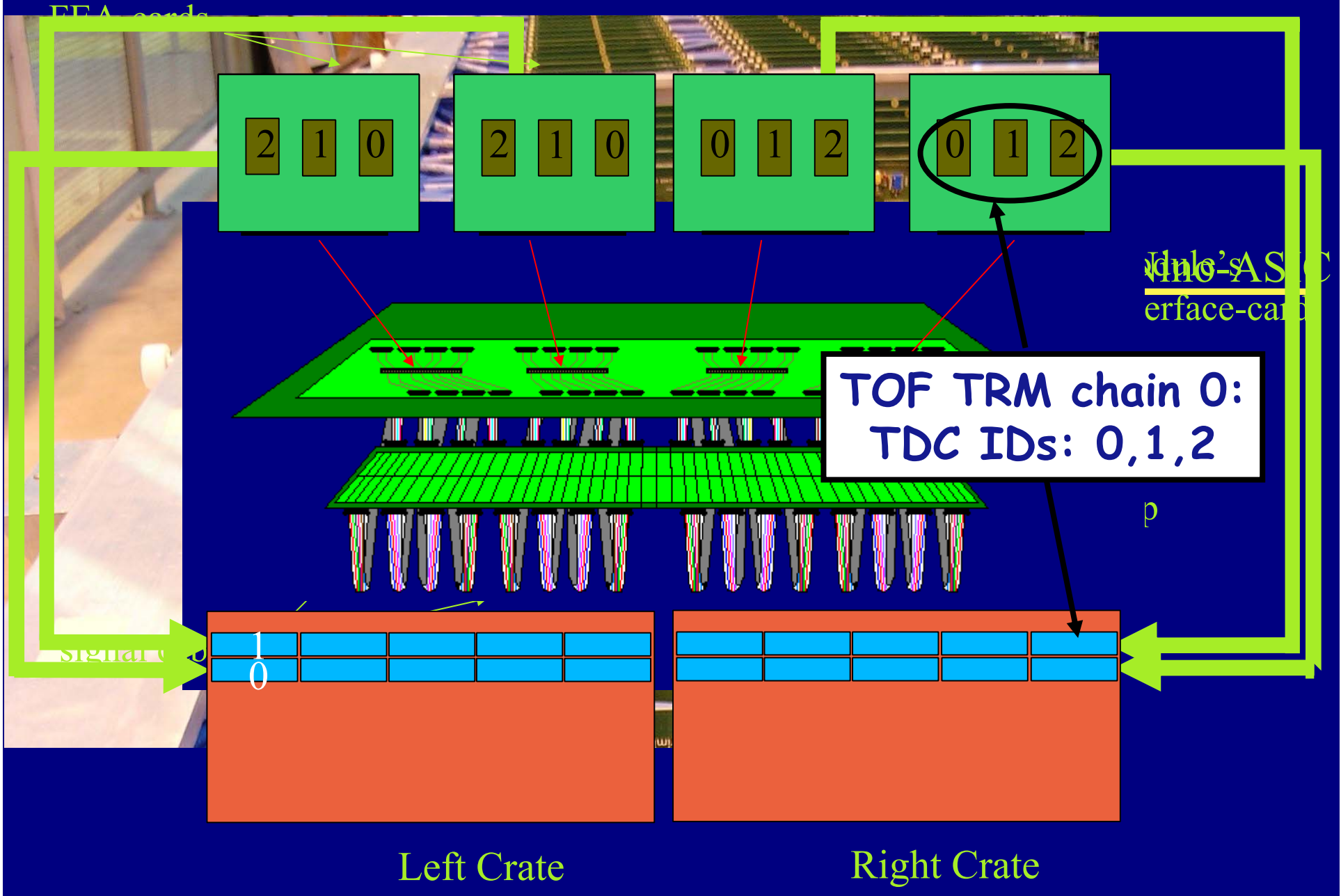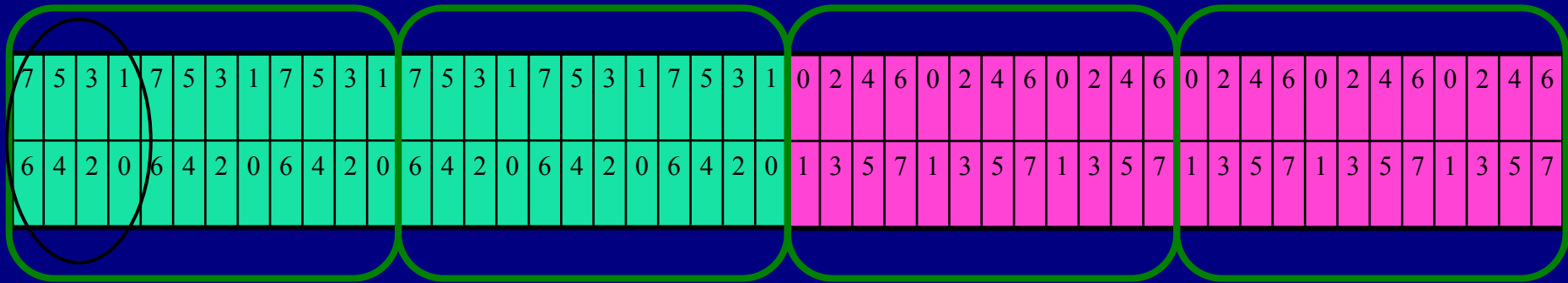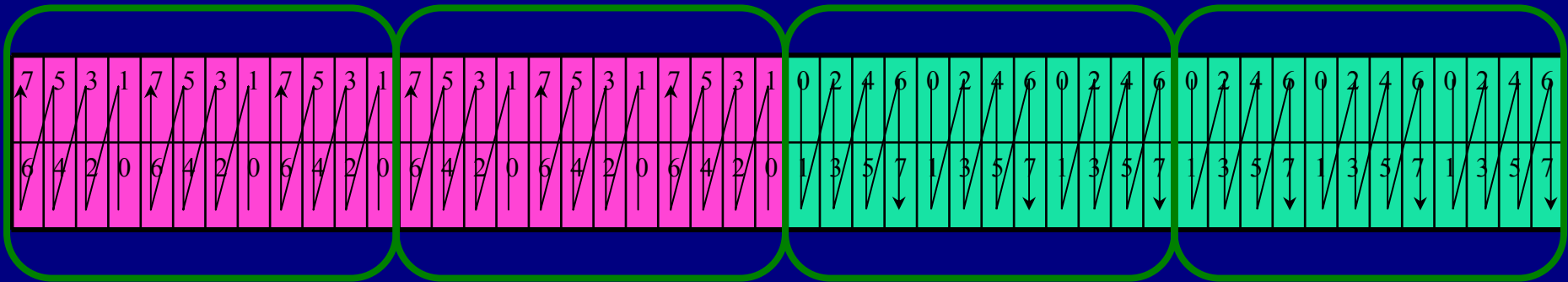**RIGHT**

BACK Frame (Side C)

LEFT

7	5	3	1	7	5	3	1	7	5	3	1	7	5	3	1	7	5	3	1	7	5	3	1	0	2	4	6	0	2	4	6	0	2	4	6	0	2	4	6	0	2	4	6	0	2	4	6
6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0	1	3	5	7	1	3	5	7	1	3	5	7	1	3	5	7	1	3	5	7	1	3	5	7

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7	5	3	1	7	5	3	1	7	5	3	1	7	5	3	1	7	5	3	1	7	5	3	1	0	2	4	6	0	2	4	6	0	2	4	6	0	2	4	6	0	2	4	6	0	2	4	6
6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0	1	3	5	7	1	3	5	7	1	3	5	7	1	3	5	7	1	3	5	7	1	3	5	7

LEFT

BABY Frame (Side A)

RIGHT

Z

Summary

2. DDL/EquipmentID mapping - I would like to remind the detectors, which didn't send me yet this information, to do so and/or to present it in their talks.

✓Done

3. Geometrical mapping (inside a DDL) - please make sure that you contacted the corresponding hardware experts and report what is already implemented in AliRoot, what is to be implemented and the time needed to finalize this task.

✓Done

5. Status of raw-data reconstruction. Please report also if the 'real' raw-data would necessitate some additional preprocessing and the time needed to develop the corresponding algorithms.

No (?)

6. Removal of all the dependencies on gAlice in raw data reconstruction - as you know in case of 'real' raw data reconstruction, there is no gAlice available, so all the detector configuration parameters should be either fixed (if they will never be changed in the future) or read from Conditions DB. The easiest way to check for gAlice dependencies is to remove galice.root and start the reconstruction using just the raw-data file as an input.

We still have a gAlice dependency in AliTOFClusterFinder and AliTOFtracker classes, will be removed within this week

* Raw-data visualization - your plans for development for raw-data visualization within the aliroot event display (EVE).

Nobody working on it yet, because of other priorities; taking care of this soon...

* Raw2(S)Digits method needed for event embedding - this item concerns only the detectors which doesn't have it implemented.

Raw2Digits method exists (in the AliTOFClusterFinder class, plan to move it in the AliTOFDigitizer). Raw2SDigits method has still to be implemented: plan to do it on a short term (in the AliTOFSDigitizer class)