STRAWS AND EMC JOINT TESTS
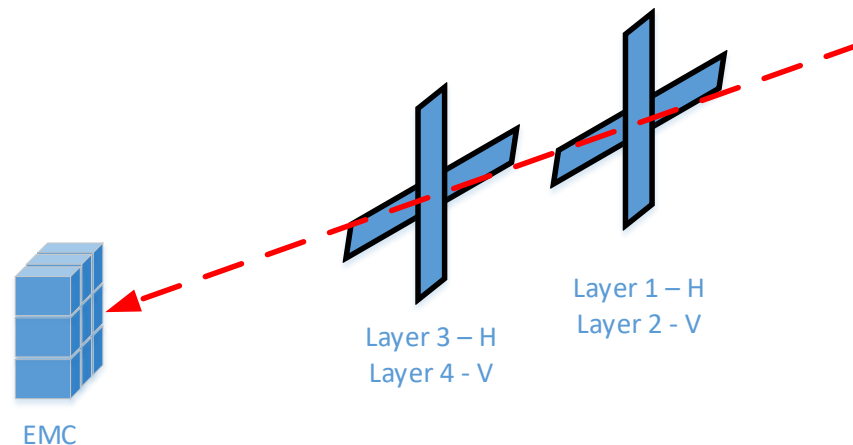
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2018 Kraków

Goals

- First mini-PANDA prototype
    - 2 independent subsystems
    - SODANet synchronization
    - Burst-building and filtering on Compute Nodes

- Framework for development of online-tracking on straws

- Evaluation of straws modules

Detector setup

- Straws
  - 4 layer: 2 horizontal, 2 vertical
  - Each layer has 2 modules
  - Each module has 32 straws
  - 256 straws in total

- EMC
  - 3x3 crystals

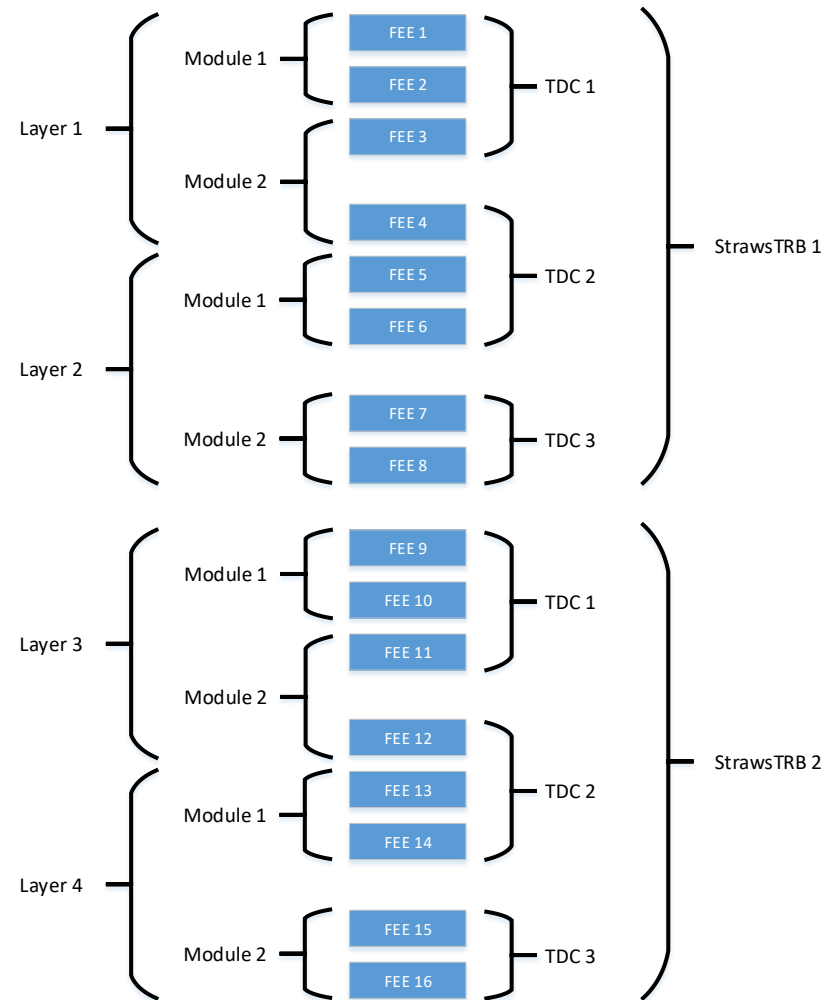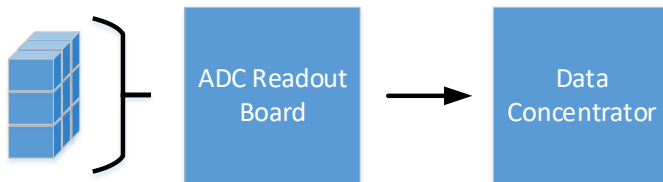Many thanks to Jerzy Smyrski and Bartek Korzeniak for straws preparation!

Layer 1 – H
Layer 2 - V

Layer 3 – H
Layer 4 - V

EMC

Readout setup

- Straws
  - 16x PASTTREC FEE cards
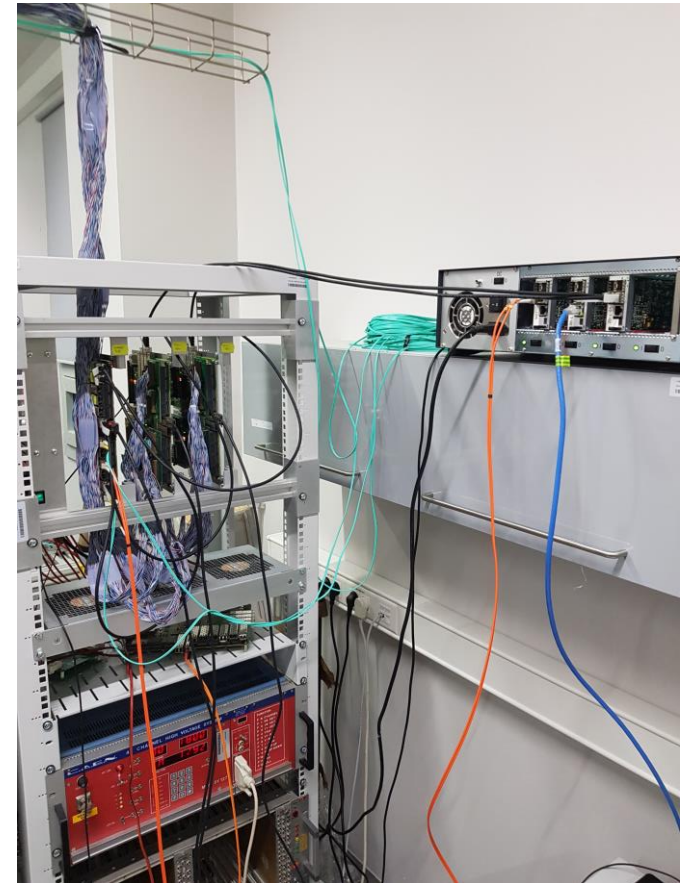 - 2x TRBs
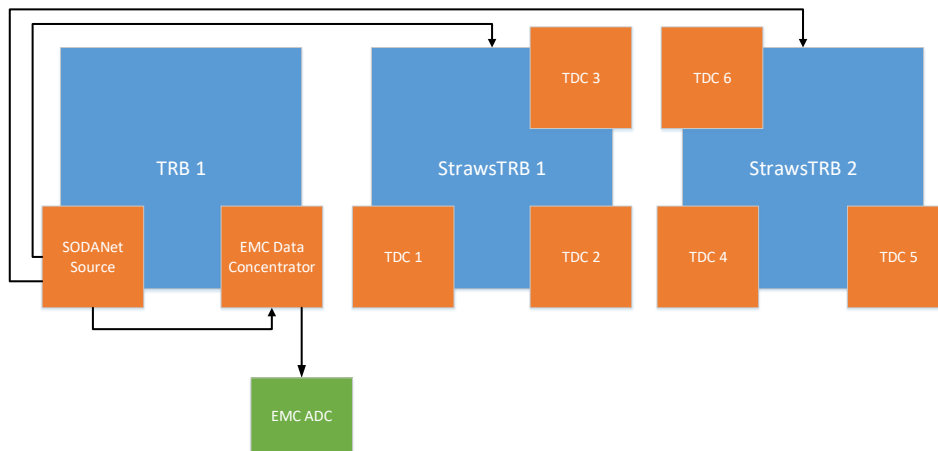
- EMC
  - EMC ADC card
  - Data Concentrator

SODANet synchronization

- 3x TRBs
  - TRB1:
    - Slow control Gateway
    - SODANet Source
    - EMC Data Concentrator

  - StrawsTRB1 and 2
    - TDCs for PASTTREC readout
    - Central FPGA as SODANet receiver and local HUB

Burst building

- Data sources:
  - EMC
    - 1x Optical link 2Gb, 8/10b
    - Output from the EMC Data Concentrator
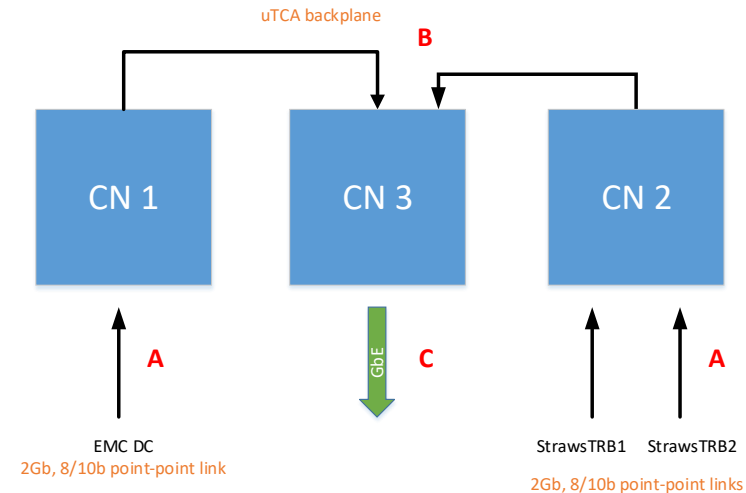 - Straws
    - Each StrawsTRB
      - 1x Optical link 2Gb, 8/10b
      - 1x Optical link Gigabit Ethernet (mirrored)

- Compute Nodes:
  - CN1: receives data from EMC DC and forwards to CN3 through backplane
  - CN2: receives and merges data from StrawsTRB1 and StrawsTRB2, forwards to CN3 through backplane
  - CN3: receives and merges data from CN1 and CN2, sends out to storage through Gigabit Ethernet

- Additional Straws burst building
  - Standard event builder on PC from direct GbE data

uTCA backplane

| CN 1 | CN 3 | CN 2 |

EMC DC
2Gb, 8/10b point-point link

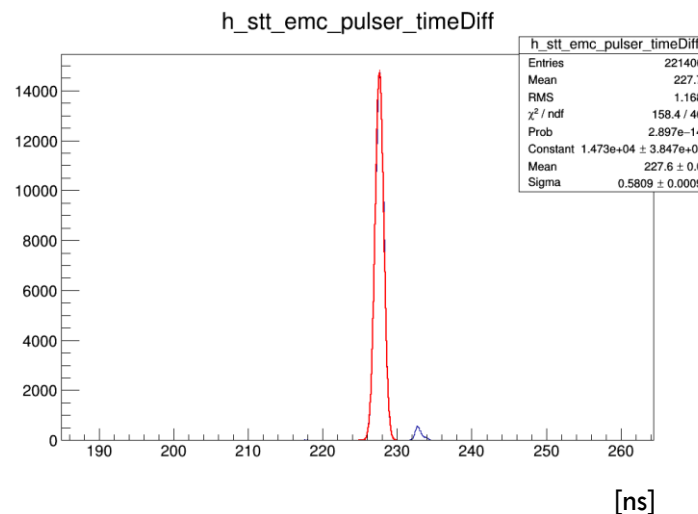StrawsTRB1   StrawsTRB2
2Gb, 8/10b point-point links

Work progress

- Day 1
  - Detectors up and running

- Day 2
  - Individual readout subsystems up and running

- Day 3
  - Synchronized subsystems up and running

First test - pulser

- Pulser supplied to:
  - LED located in EMC box
  - TDC channel of StrawsTRB1

- Verification of proper SODANet synchronization
- Verification of proper Burst-Building
- Verification of custom data unpacker

- Pulser visible in the same bursts with 0.5ns resolution (raw data, no calibration)

h_stt_emc_pulser_timeDiff

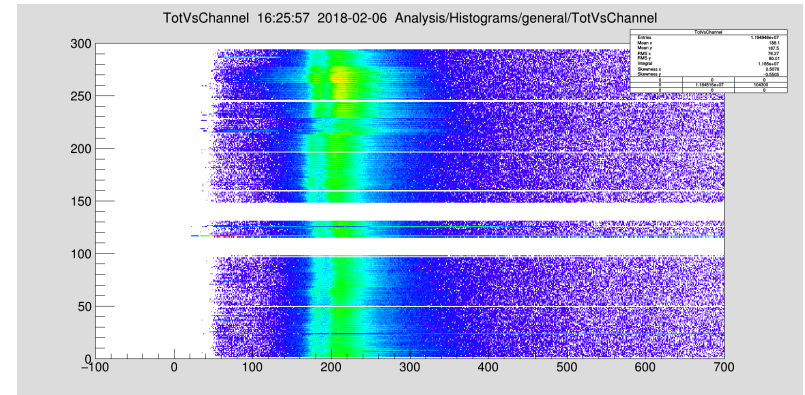| h_stt_emc_pulser_timeDiff	
Entries	221406
Mean	227.7
RMS	1.168
χ^2 / ndf	158.4 / 46
Prob	2.897e−14
Constant	1.473e+04 ± 3.847e+01
Mean	227.6 ± 0.0
Sigma	0.5809 ± 0.0009

[ns]

Second test – cosmic run

- 15h of cosmic data collected
  - Straws FEE not calibrated

- Run for development and evaluation of analysis software

- Development in progress

Further plans

- Straws calibration
  - DONE

- Analysis:
  - Straws – EMC corellations
    - IN PROGRESS
  - Software tracking

- HW Processing:
  - Development of the tracking firmware on intermediate board

Many thanks to Akshay and Narendra for calibration!