DAQ beyond 2021
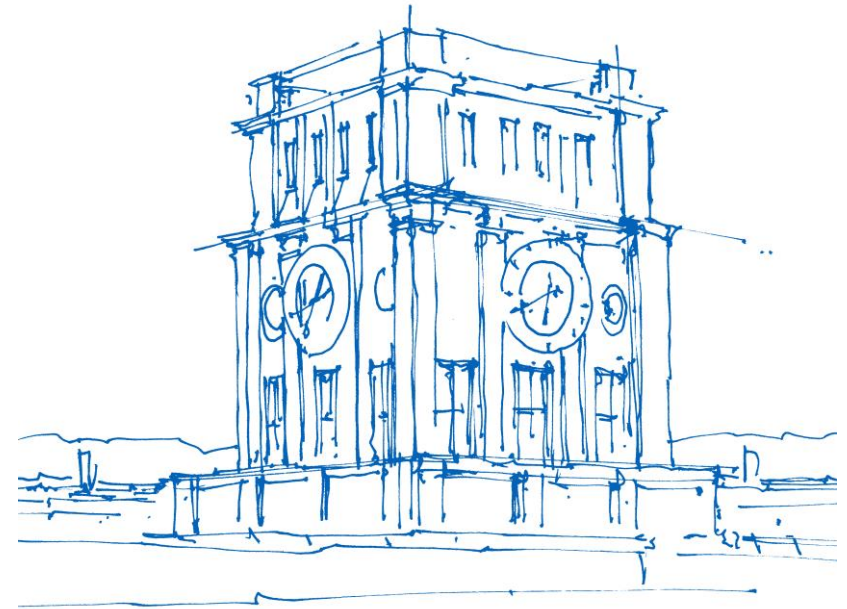
Igor Konorov
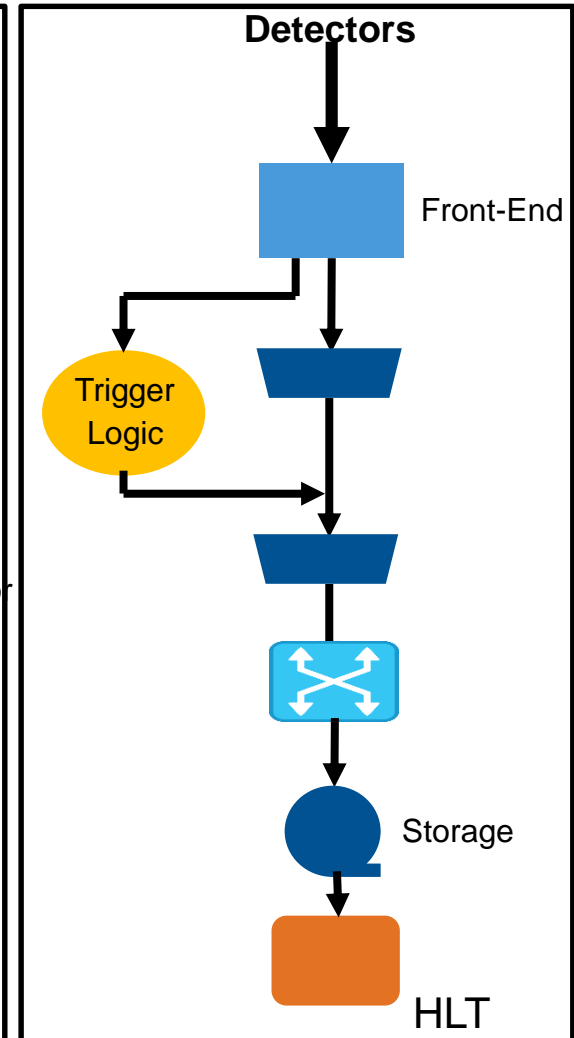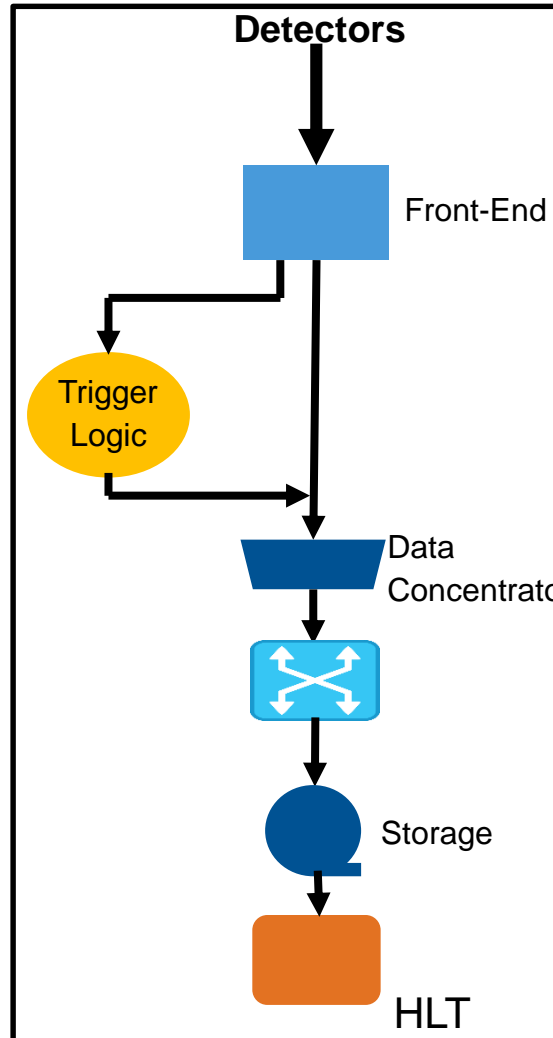
COMPASS TB Meeting
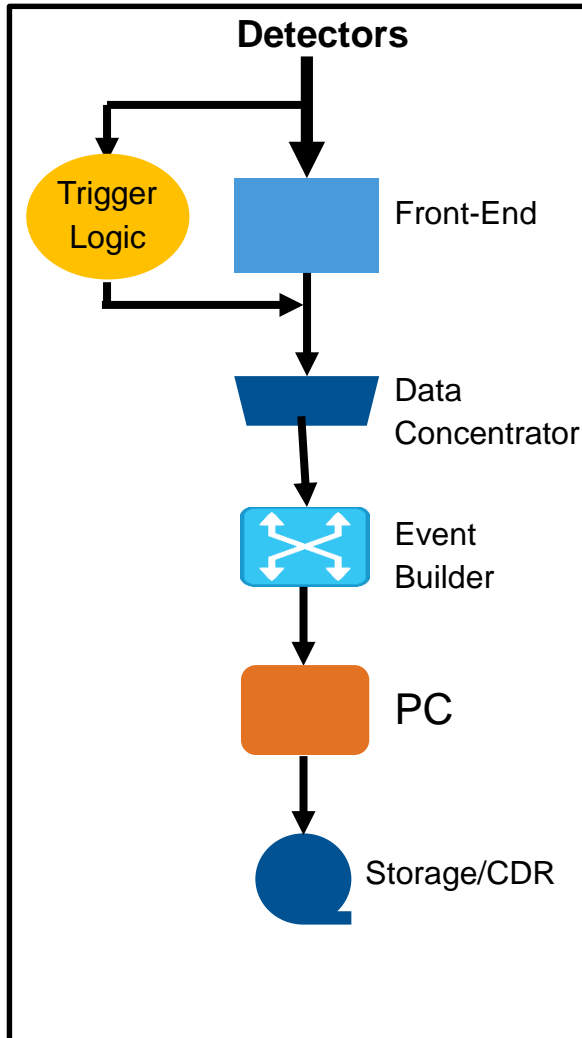
CERN Geneva June 5-th

Project Goal

Development of new DAQ to collect higher quality data with higher statistics
=> provision of high precision measurements

Motivation

- FEE can provide 100% of detector information without external trigger
- Digital Trigger logic integrated in DAQ
- High data rate capability, flexible, precise, easy to maintain and adopt to different selection criteria

From Triggered to Trigger less

Plan

1. Build Trigger-less DAQ for Proton Radius Measurement for 2022 run
    *   2018 form a group and assign responsibilities
        -   Discussion with interested groups, possible responsibilities and man power assignment
        -   Workshop in October-November
    *   2019 development of prototype system
    *   2020 production
    *   2021 pilot run

2. Extend the concept to all other detectors after LS3

Preliminary List of Responsibilities

- Trigger Processor   - Bonn, Mainz, TUM, Freiburg (?)
- SciFi   - TUM, Bonn
- Silicon detector   - Torino, TUM
- TPC   - Gatchina, Bonn, Saclay
- DAQ   - TUM, Dubna, Prague
- iFTDC   - TUM
- High resolution TDC   - Freiburg, Torino
- ADC feature extraction   - Warsaw

- ?   - Trieste ICTP, INFN

iFTDC

- Existing firmware
  - 64 channels
  - 1ns bin or 350 ps resolution
  - 10% DNL

- New firmware :
  - 64 channels
  - 0.5ns bin or 200 ps resolution
  - 20% DNL

- Possible improvements
  - 32 channels
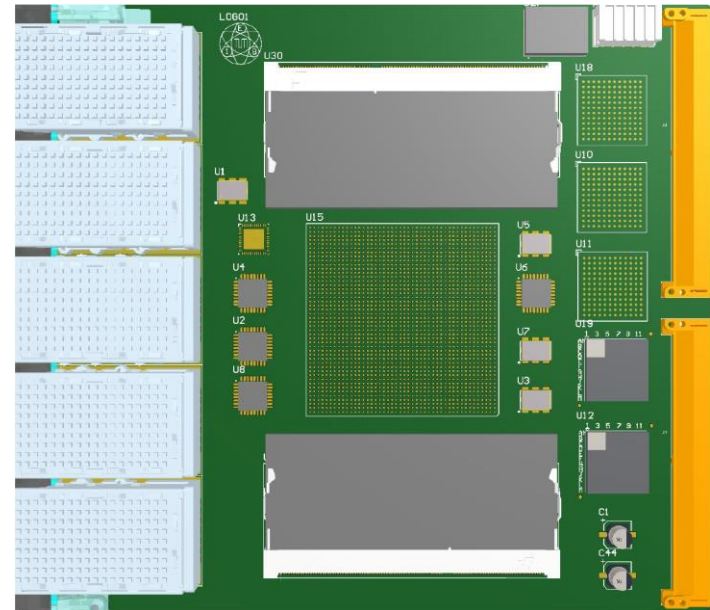 - 250 ps bin or below 100 ps resolution
  - DNL ?

DAQ Hardware and Trigger Processor

Technical parameters :

- Double width AMC card
- XCKU095-1FFVB2104
  - 64 x 16Gb/s
- 2 x 16 GB DDR4 SODIMM,
- AMC connector Interfaces
  - TCS, Ethernet(IPBUS)
  - 3 x 16Gb/s
- Front panel interfaces
  - 60 x 16Gb/s

Status

- Schematic been finalized by end of June
- Layout will be done in outside company
- 3 FPGAs were ordered, 16kEuro
- Production in September

Last slide

Critical issue is Manpower

- No access to CERN Gentner program to hire PHD students due to lacking CERN supervisor
- No CERN PHD students

- Only two PHD students(Moritz, Antonin) are expected to work on the project for a moment
- Hope to collect more manpower by end of 2018. If we do not manage to collect the project will not start

THANK YOU

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