

# DAQ system for test-beam efforts

Matthew Wing (UCL)

# Outline

- Introductory remarks
- CALICE DAQ system
- (EUDET) tracker and vertex detector DAQ systems
- Final remarks

# Introductory remarks

- Various different detector systems with various different DAQ systems :
  - in isolation this is okay;
  - if considering running detectors together (e.g. in test-beam), more thought needed.
- For a combined test beam :
  - do not need to have same hardware and/or software;
  - but they need to be “brought together”, communicate with each other at some point;
  - so as much commonality is preferable and should make integration easier;
  - which needs to be done early;
  - however there will be constraints : schedules, effort available/needed, money, etc..
- This workshop needs to consider the DAQ systems planned for detectors to be placed in a test-beam.
- More importantly, this needs to be considered in the context of what combined (slice test) running is planned ? Timelines, detectors, etc..
- Some brief remarks on CALICE and (EUDET) vertexing and tracking DAQ systems—I have received no input...

# CALICE DAQ system overview

- A VME-based (using a modified CMS board) DAQ system has been in use for current test beam programme.
- A new system being developed : more generic, modern links and FPGAs :

(**Detector Unit:** ASICs)

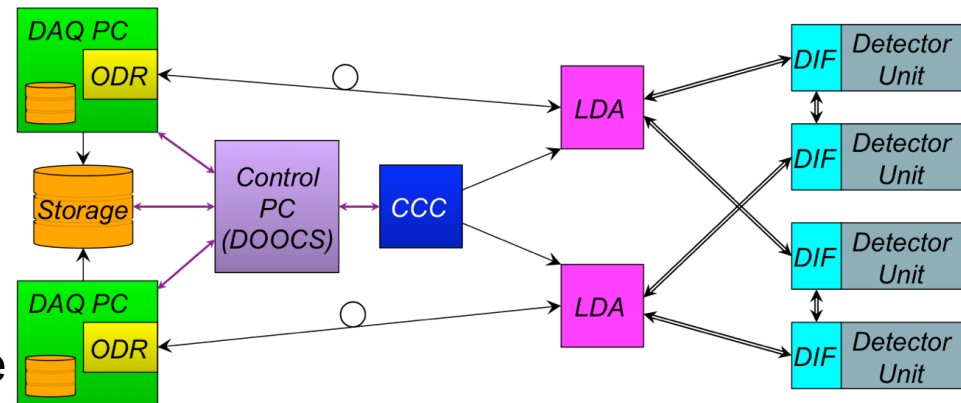
**DIF:** Detector InterFace connects generic DAQ and services

**LDA:** Link/Data Aggregator fansout/in DIFs and drives links to ODR

**ODR:** Off-Detector Receiver is PC interface

**CCC:** Clock and Control Card fans out to ODRs (or LDAs)

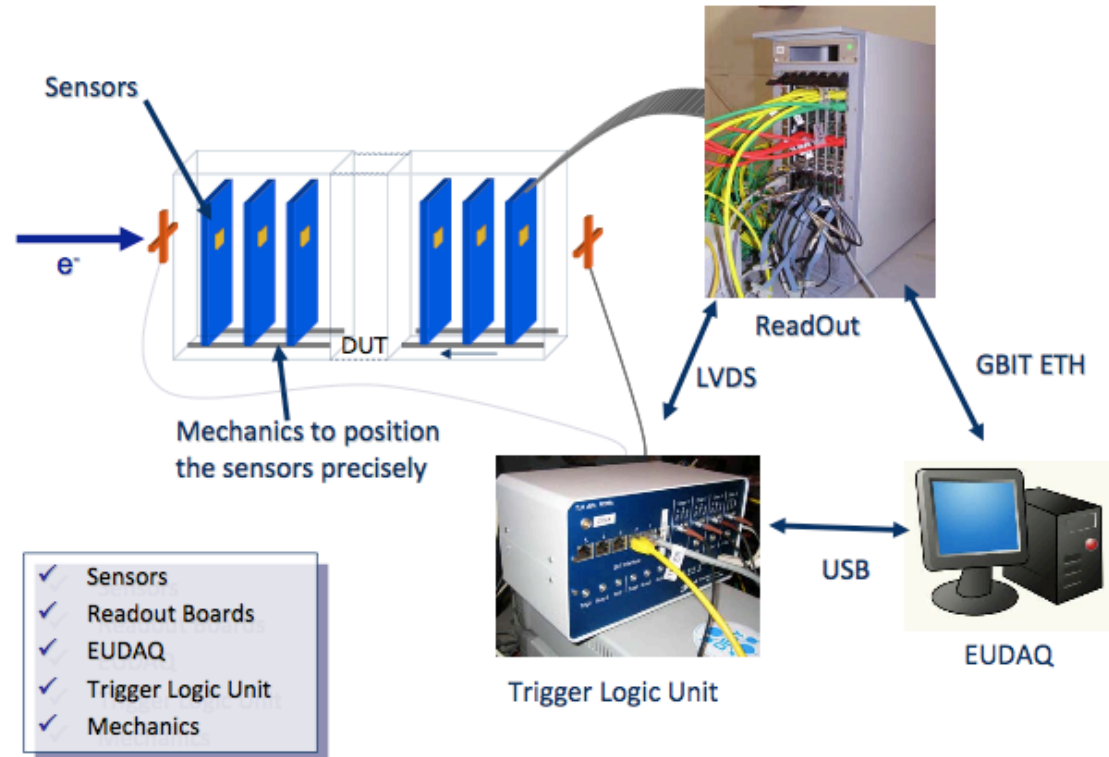
**Control PC:** Using DOOCS (software developed for XFEL)



- In principle, everything behind the DIF can be used by any detector. Note we have to read out ECAL, DHCAL, AHCAL, etc..
- Certainly the concept, if not the detailed system, could be used (as a basis) for combined test-beam running...
- Currently undergoing integration of modules and with calorimeter(s) and ensuring sufficient numbers exist.

# (EUDET) pixel telescope DAQ

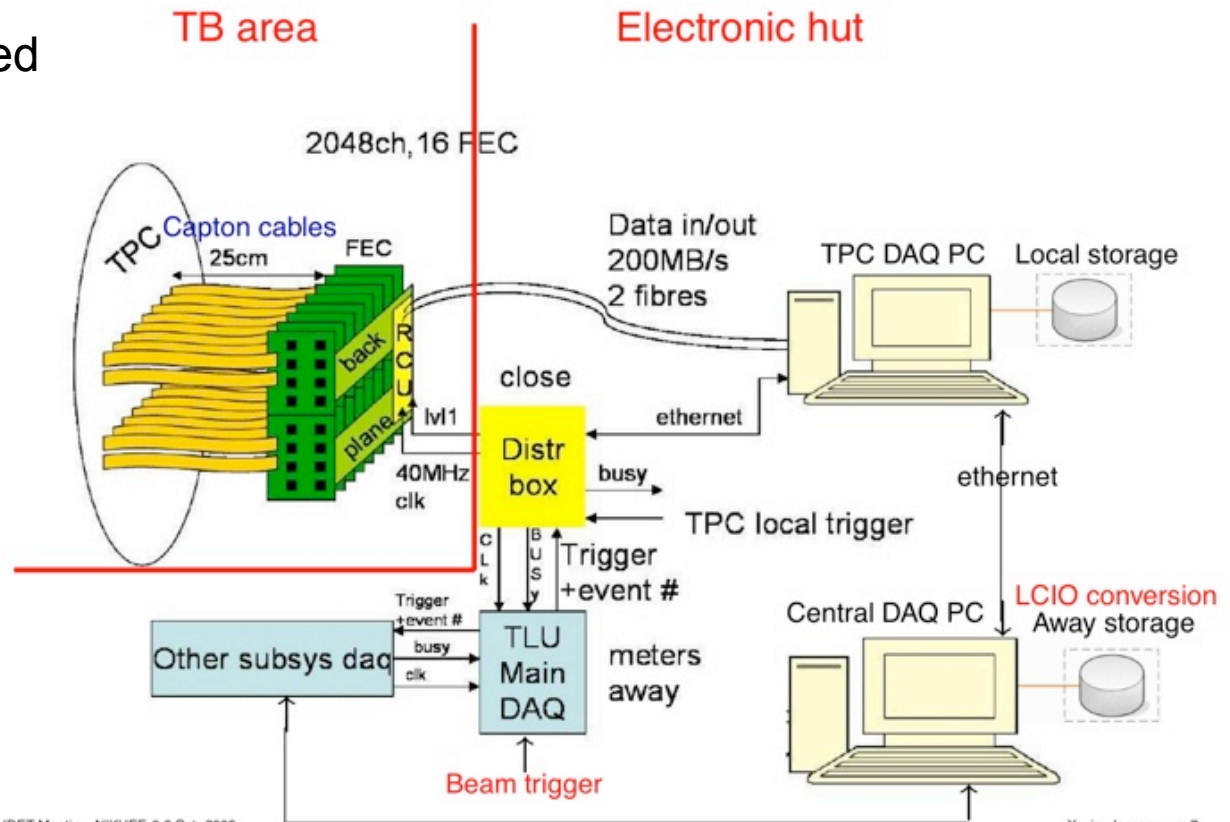
- VME-based readout card (EUDRB) for analogue sensors, being upgraded for digital chip (up to 1 kHz).
- DAQ architecture is robust, multi-platform, scalable and adoptable to different users.
- Written in C++ and available on hepforge.
- Software based on existing ILC software framework and runs on grid.
- Being used by TPC within EUDET showing flexibility.
- Appropriate for larger scale systems and higher rates ?



# (EUDET) TPC DAQ

- Hardware based on ALICE and T2K TPCs
- Local readout software based on ALICE DAQ.
- Slow control being developed within DOOCS.
- Integrating into same software as previous page.

## *ALTRO r/o: LC-TPC DAQ overview*



# Final remarks

- Commonality in DAQ systems needed in combined test-beam running :
  - what common test-beams will happen ?
  - still anyway useful to think about and work towards for future needs (the lead time is long). However, accept that this is hard to do.
- This presentation is not complete as I have surely missed out detectors. At least for CALICE it should be complete as this has calorimetry R&D under one umbrella.
- Workshop needs to address :
  - what/when common test-beam running will happen ?
  - review of DAQ systems for various detector groups to see which could be ported to other detectors and used overall.
    - ▶ can join up in software, but at what stage ?
    - ▶ hard to change hardware but not completely impossible given enough time and a scheme/project such as EU grants or agreements as within CALICE. Discuss possibilities.
  - what comes after the DAQ software.