

DAQ Test during Pilot Run

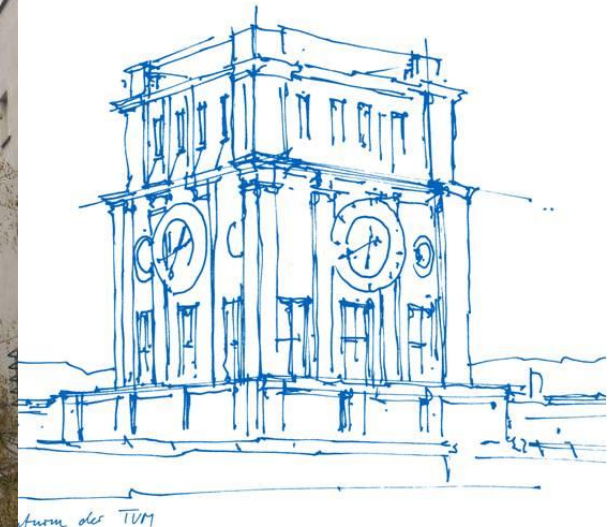
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DAQFEET Workshop, 9-th February 2021



Turm der TUM

Overview

- Attached detectors
- Readout system
- Plans for DAQ tests
- TPC readout scheme

Detectors In 2021 Pilot Run

- TPC - CEDAR region
- PRM SciFi - CEDAR region
- Hodoscopes, VETO - CEDAR region
- Sci Counters - CEDAR region

- 5 x 5 ECAL2 prototype - downstream of beam line at end of 888
- Warsaw SciFi - downstream of beam line at end of 888

DAQ Foreseen for Pilot Run

FriDAQ

- 6 x Data Concentrators L0
 - IFTDC
- Cross-point switch
- SB Switch
- 2 x (Spill Buffers + Readout Engine Servers)
- 2 x HLT Servers

Standalone DAQ

- MSADC
- MSADC + New FPGA Card with Zinq FPGA

For discussion : how to acquire data during the pilot run

- SIS ADC, 32 channels 14 bits up to 250 MSPS

Plans for FriDAQ Tests

- Expecting to run during entire run period
- Test of DAQ data chain
 - Debugging and commissioning of DAQ data chain
 - Commissioning of IFTDC readout
 - Collect data with different IMAGE and SLICE sizes
- Advanced DAQ tests
 - T0 calibration
 - Software trigger algorithm

ECAL2 Prototype Plans

Setup

- 5 x 5 ECAL2 matrix with MSADC + new Zinq FPGA card
- Warsaw SciFi
- Beam counters

DAQ Scenarios

- Integrate to FriDAQ ?
- Standalone, transmit data via Ethernet to PC

Objectives

- Lossless data compression
- Test of feature extraction algorithms

Preferable TPC RO Integration in DAQ, longer term

COMPASS++/AMBER Trigger Control System

- Common clock 38.88 / 77.76 / 155.52 MHz
- Time Slice information distributed every 0.5 – 10 ms
 - fixed value, depends on data rate
 - Spill number, Slice ID, absolute time within spill

TCS Common time reference

- TCS clock(NIM, ECL, TTL, LVDS)
- TCS controller generates any sequence of signals for TPC RO every time slice (NIM, ECL, TTL, LVDS)
 - **Start/Stop Run**
 - Spill number, Slice ID, absolute time within spill

Data transmission TPC => DAQ

- Optical High Speed Serial Links 1.25/2.5 Gbps
- UDP packets , Aurora frames(preferable), ...
- One time Slice => one data block (few UDP/Aurora packets/frames)
- Data shall contain Spill number, Slice ID, Absolut time within spill + Payload

Outcome of Meeting with TPC Experts

- SIS ADC 14 bits @250MHz – commercial product with closed firmware
- Downgrade data rate to 40 MSPS
- Transmit 100% of data, not sufficient bandwidth of serial link
- Order implementation of data compression algorithm in SIS
- Details of Interface to DAQ was not discussed

Feasible implementation for 2021 run?

Alternative :

COMPASS Stand alone DAQ as in 2018

2018 Pilot PRM Run Configuration

Stand alone TPC DAQ

Common time reference

- TRLO II
- 100 MHz Clock
- Every 5.24288 ms TRLO II sends out absolute time encoded in serial sequence
- Special iFTDC firmware version measured the time pattern for every physics event => **Time Stamp**

Start/Stop of Run

- Script commands issued by COMPASS DAQ

TPC Data Transfer

- Self triggered mode
- TPC data stored locally with the same **Time Stamp** information

2021 Pilot Run

Standalone COMPASS DAQ

- PRM SciFi
- Beam counters
- IFTDC for synchronization with SpeakTime system
- ALPIDE readout ?
- **Shall we consider to borrow beam telescope ?**

Standalone TPC DAQ

THANK YOU