

DAQ/FEE/Trigger for COMPASS beyond 2020 workshop

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CTU FNSPE Prague

Book of Abstracts

Contents

Welcome address	1
COMASS DAQ : Where we are and where we want to go	1
COMPASS future physics program	1
Proton radius measurement	1
Overview about trigger hardware	2
Trigger Processor	2
FPGA based trigger development	2
Data filtering for calorimeters	2
Development in Saclay	2
Alice ASIC for TPC	3
Experience and developments in ASIC design at INFN Torino	3
INFN Torino Electronics Service	3
Pico TDC	3
MWPC read out	4
Bus Crates, Shelves at CERN	4
DAQ Software Interventions before 2018 Run	4
iFDAQ	4
Future iFDAQ and FEE Architecture	5
COMPASS DAQ Beyond 2020	5
Discussion	5
Command line interface	5
COMPASS API	6
DAQ Deployment Application	6

Event Size Display	6
Support Tools	6
Letter of Intent on the Common R&D project to upgrade the COMPASS Polarized Target with Recoil Detectors (PT with RD)	7
PID inside the COMPASS PT	7
Proposal for a possible recoil tracker based on double side Si-microstrip detectors	7
Activities of LTU for high energy physics experiments	7
PANDA experiment	7
Spin Physics Experiments at NICA-SPD	7
Current iFDAQ Software Status	8

Introduction / 1**Welcome address**

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Introduction / 2**COMASS DAQ : Where we are and where we want to go**

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Introduction / 3**COMPASS future physics program**

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The M2 beam line at CERN is a unique hadron and muon facility. COMPASS has submitted a proposal requesting the extension of the COMPASS-II program in and beyond 2021. A Letter of Intent will be submitted by the end of 2017 suggesting a rich physics program to explore hadron structure using conventional meson beams, muon beams, and finally RF-separated hadron beams to enhance the fraction of beam kaons and anti-protons.

Introduction / 4**Proton radius measurement**

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The measurement of the proton radius is part of the proposal for the future COMPASS program. While continuing to use the DAQ and trigger system in the current way appears to be feasible, improving in particular the trigger is desirable to increase the number of recorded elastic events. I will present some ideas to achieve this, along with presenting the requirements to the COMPASS set-up for a successful measurement.

Trigger / 5

Overview about trigger hardware

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Trigger / 6

Trigger Processor

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Trigger / 7

FPGA based trigger development

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FEE development / 8

Data filtering for calorimeters

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FEE development / 9

Development in Saclay

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FEE development / 10

Alice ASIC for TPC

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FEE development / 11

Experience and developments in ASIC design at INFN Torino

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The presentation will describe the ASIC design activities at INFN Torino, with special focus on the developments for hybrid and monolithic pixel detectors, for timing measurements and for high speed data transmission circuit. ASICs currently used in various applications (ALICE ITS, COMPASS RICH, GBT common interface and medical interface) will be described, together with the recent developments in timing applications and HL-LHC prototypes.

FEE development / 12

INFN Torino Electronics Service

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Electronics Service of the Turin section of INFN (Electronics Laboratory) fulfills all the requests made by different physics research groups providing both design, systems realization and test capabilities of discrete electronics and microelectronics devices.

Design activities range from the very front-end electronics to the development of full read-out and data acquisition systems.

Microelectronics design is one of the main activity of the Laboratory for the development of full-custom ASICs circuits. The team of IC designers has a long experience in analogue, mixed-mode or digital IC design.

In addition the Electronics Laboratory provides design capabilities oriented to the implementation of Printed Circuit Boards (PCBs) and to digital programming techniques using Field Programmable Gate Arrays (FPGAs).

This presentation gives a very short overview of all this activities, focusing on relevant projects and recent developments.

FEE development / 13**Pico TDC****Author:** Moritz Horstmann¹¹ *CERN***Corresponding Author:** moritz.horstmann@cern.ch**FEE development / 14****MWPC read out****Author:** Maxim Alexeev¹¹ *Universita e INFN Torino (IT)***Corresponding Author:** maxim.alekseev@cern.ch**Status Overview / 15****Bus Crates, Shelves at CERN****Author:** Markus Joos¹¹ *CERN***Corresponding Author:** markus.joos@cern.ch**DAQ / 18****DAQ Software Interventions before 2018 Run****Author:** Ondrej Subrt¹¹ *Czech Technical University (CZ)***Corresponding Author:** ondrej.subrt@cern.ch

The preliminary schedule of DAQ changes before the Run 2018 has been already discussed and accepted. There are prepared two major interventions. The current DAQ is limited to event size up to 512 KB. First intervention gets rid of such event size restriction and provides with more general DAQ. Second intervention takes into account the integration of cross-point switch. It considers all aspects such as database, new slave control process and responsibilities of master process. Moreover, the contribution defines all allowed features in Topology GUI based on the current DAQ status from the user's point of view. In the end, open questions rising from the cross-point switch integration are stated.

DAQ / 19

iFDAQ

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DAQ / 20

Future iFDAQ and FEE Architecture

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DAQ / 21

COMPASS DAQ Beyond 2020

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DAQ / 22

Discussion

DAQ / 23

Command line interface

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Having a graphical-only user interface to the DAQ has proven problematic in two matters: remote access and run control automation. This talk will address the current status of the command-line interface and describe how it solves these problems, including the “script mode“ feature introduced earlier this year. A short workshop session on how to write scripts against this interface will also take place during this talk. Finally, future plans will be discussed, especially the relationship of the command-line interface and the COMPASS API.

DAQ / 24

COMPASS API

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DAQ / 25

DAQ Deployment Application

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DAQ / 26

Event Size Display

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DAQ / 27

Support Tools

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In our contribution, we present several tools that simplify work with data taking shifts at COMPASS experiment at CERN. At first, we introduce online shift reservation tool. Administrator (or year coordinator) can use the tool to define list of shift for given data taking period. Members of the experiment use the tool to sign in for shifts according to their preferences. The tool automatically calculates served shifts for each institution, moreover concept of coefficients that rate different types of shifts (night, weekend) was introduced. In the second part of our talk, we present electronic checklist which would replace need to fill in paper forms. The shifter downloads form prepared by administrator into tablet, fills it in, and uploads the result. The application is able to work offline, moreover it verifies that all values are valid and within correct range. Both applications are prepared for deployment in the case they are approved.

PT / 28

Letter of Intent on the Common R&D project to upgrade the COMPASS Polarized Target with Recoil Detectors (PT with RD)

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PT / 29

PID inside the COMPASS PT

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PT / 30

Proposal for a possible recoil tracker based on double side Si-microstrip detectors

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PT / 31

Activities of LTU for high energy physics experiments

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32

PANDA experiment

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PT / 33

Spin Physics Experiments at NICA-SPD

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Status Overview / 34

Current iFDAQ Software Status

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The contribution presents development and recent status of the Data Acquisition Systems (DAQ) of the COMPASS experiment at CERN. It focuses especially on development and deployment of the new communication library DIALOG and DAQ Debugger for the error detection. The DIALOG library is a communication system both for distributed and mixed environments, it provides a network transparent inter-process communication layer. In general, state-of-the-art Data Acquisition Systems (DAQ) in high energy physics experiments must satisfy high requirements in terms of reliability, efficiency and data rate capability. In complex software, such as the DAQ, having thousands of lines of code, the debugging process is absolutely essential to reveal all software issues. The resultant DAQ stability is discussed at the end and comparison with previous years is given.